MAR 10 1921

SERIES 3—Vol. 4, No. 3 MARCH, 1921

AMERICAN JOURNAL OF OPHTHALMOLOGY

Incorporating — Established by

THE AMERICAN JOURNAL OF OPHTHALMOLOGY.....Adolph Alt 1884
THE OPHTHALMIC RECORD.....Giles C. Savage 1891
ANNALS OF OPHTHALMOLOGY.....James Pleasant Parker 1892
ANALES DE OFTALMOLOGIA.....M. Uribe-Troncoso 1898
OPHTHALMOLOGY.....Harry Vanderbilt Würdemann 1904
OPHTHALMIC YEAR BOOK AND LITERATURE.....Edward Jackson 1904-11

EDITORIAL STAFF

EDWARD JACKSON
Editor
M. URIBE-TRONCOSO
MEYER WIENER

CLARENCE LOEB
Associate Editor
CASEY A. WOOD
HARRY V. WÜRDEMANN

COLLABORATORS

FRANK ALLPORT, *Chicago;* HUGO W. AUFMWASSER, *Denver;* HANS BARKAN, *San Francisco;* ARTHUR J. BEDELL, *Albany;* EDMOND E. BLAAUW, *Buffalo;* MELVILLE BLACK, *Denver;* NELSON M. BLACK, *Milwaukee;* FRANK E. BRAWLEY, *Chicago;* W. E. BRUNER, *Cleveland;* BURTON CHANCE, *Philadelphia;* WM. H. CRISP, *Denver;* W. T. DAVIS, *Washington, D. C.;* GEORGE S. DERBY, *Boston;* ALEXANDER DUANE, *New York;* EDWARD C. ELLETT, *Memphis;* MARCUS FEINGOLD, *New Orleans;* WM. C. FINNOFF, *Denver;* M. W. FREDRICK, *San Francisco;* HAROLD GIFFORD, *Omaha;* SANFORD R. GIFFORD, *Omaha;* HARRY S. GRADLE, *Chicago;* JOHN GREEN, JR., *St. Louis;* D. F. HARBRIDGE, *Phoenix, Ariz.;* WM. F. HARDY, *St. Louis;* GUSTAVUS I. HOGUE, *Milwaukee;* THOMAS B. HOLLOWAY, *Philadelphia;* JOHN A. MCCAW, *Denver;* CHARLES H. MAY, *New York;* WM. R. MURRAY, *Minneapolis;* WALTER R. PARKER, *Detroit;* GILES C. SAVAGE, *Nashville;* F. MAYO SCHNEIDEMAN, *Philadelphia;* THEODORE B. SCHNEIDEMAN, *Philadelphia;* GEORGE E. DE SCHWEINITZ, *Philadelphia;* T. H. SHASTID, *Superior, Wis.;* CHARLES P. SMALL, *Chicago;* A. C. SNELL, *Rochester, N. Y.;* GEORGE W. SWIFT, *Seattle;* D. L. TILDERQUIST, *Duluth;* WILL WALTER, *Chicago;* JOHN E. WEEKS, *New York;* WM. ZENTMAYER, *Philadelphia;* CHARLES ZIMMERMANN, *Milwaukee. Foreign:* SIR JAMES W. BARRETT, *Melbourne, Australia;* MARCEL DANIS, *Brussels, Belgium;* ENRIQUE B. DEMARIA, *Buenos Aires, Argentina;* ROBERT HENRY ELLIOT, *London, England;* J. SANTOS FERNANDEZ, *and* F. M. FERNANDEZ, *Havana, Cuba;* J. DE J. GONZALEZ, *Leon, Mexico;* H. J. HOWARD, *Peking, China;* M. LANDOLT, *Paris, France;* J. KOMOTO, *Tokyo, Japan;* ARTHUR F. MACCALLAN, *Cairo, Egypt;* F. P. MAYNARD, *Crewe, England;* E. E. MONTAÑO, *Mexico City;* SPECIALE CIRINCIONE, *Rome, Italy;* FREDERICK C. TOOKE, *Montreal, Canada.*

Annual Subscription Ten Dollars in Advance,
Single Copies One Dollar.

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY
7 West Madison Street, Chicago, Illinois.

Entered as Second Class Matter January 1st, 1918, at the Post Office, Chicago, Ill., under the act of March 3rd, 1879.

Grown Great Through Service to Mankind

FROM a tiny room to the titan plant pictured above—that is a far, far span. This is the story of the house of Bausch & Lomb, the story of great growth through great service.

Nearly seventy years ago John J. Bausch dedicated himself to the task of making glasses "that human eyes might see better and farther." Obscure, maimed, in debt, he struggled through long, unrewarded years, upborne alone by his undeviating resolution to succeed through work done worthily.

Today, through the house he founded, the activities of Bausch & Lomb cover the world-wide field of optics.

Through their Microscopical Apparatus, Science discovers atomic, destructive myriads, and devises means for man's protection; through their Ophthalmic (eye) Lenses is done mankind's service in preserving man's most precious sense; through their photographic and photomicrographic lenses world and atom, nature and man are unerringly recorded; through their projection lenses and apparatus the wonders of the earth are vividly portrayed on countless screens, while their giant light reflectors flash wide assurance across the deep.

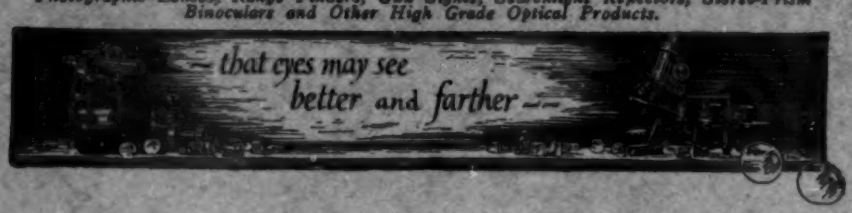
It is with a frank humility that Bausch & Lomb speak of these achievements in the field of optics. We recognize that such growth has been permitted us only by reason of that spirit of service through faithful, worthy work and the helpful co-operation of our scientific friends in the professions and trades which has tirelessly continued since John J. Bausch toiled in his little shop. That spirit is today our most greatly prized possession; and it is a spirit which we pledge ourselves to maintain in that wide field of optics where our leadership has been won.

Write for literature on any optical product in which you are interested.

BAUSCH & LOMB OPTICAL CO., 320 St. Paul Street, ROCHESTER, N. Y.

New York Washington Chicago San Francisco London

Makers of Ophthalmic Lenses and Instruments, Microscopes, Projection Lanterns (Balopticons), Photographic Lenses, Range Finders, Gun Sights, Searchlight Reflectors, Stereo-Prism Binoculars and Other High Grade Optical Products.



PROLIFERATING CHORIORETINITIS.
RIGHT EYE, SEEN IN THE ERECT IMAGE.
(DANIS' CASE.)

AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 4 MARCH, 1921 No. 3

PROLIFERATING CHORIORETINITIS.

MARCEL DANIS, M.D.

BRUSSELS, BELGIUM.

This is the report of a case of a form of lesion described by Lagrange as frequently following war injuries. Read before the Belgian Ophthalmological Society, November 20, 1920.

OBSERVATION. Van E., Ch., aged 25 years, when 7 years old was injured by a stone, which expended its force on the right eye. The upper lid was divided, and vision was lost immediately and completely. The left eye presents a hyperopia of 5 D. without any other abnormality. In the right eye the hyperopia is 8 D., and the media are transparent.

On ophthalmoscopic examination there is seen in front of the optic papilla a gray white mass, opaque, mammillated and cloudy, somewhat club-shaped, its rounded extremity extended up and outward. With the binocular ophthalmoscope of Gullstrand it is seen to protrude decidedly forward. It completely covers the optic disc, and sends two thread-like prolongations along the nasal inferior vein and artery. (See plate III.)

Behind the above mass the posterior pole of the eye is slightly excavated. All around the position of the papilla there is a circle of peripapillary choroiditis, with pigment spots more abundant to the temporal side. To the nasal side there is a small pearl-white spot with a touch of pigment at its lower end. The central vessels, of normal caliber, leave the excavation of the posterior pole ascending beside the white mass before spreading out upon the retina. The macular and paramacular region presents an accentuated dark color.

If we study the work of Lagrange on injuries of the orbit by the projectiles of war, we find that author describes a proliferating chorioretinitis which differs from simple proliferating retinitis in the following respects:

1. The proliferating chorioretinitis follows a hemorrhage and a rupture of the deep membranes.

2. It presents also the form of a fibrinous plaque, which is of more regular thickness and more localized than the multiple membranous prolongations arranged in the form of a web, extending over a great part of the fundus of the eye, that characterize proliferating retinitis.

3. This plaque is everywhere opaque, whereas the membranes of proliferating retinitis are translucent at certain parts.

4. The plaque of proliferating chorioretinitis has a simple relation of contact with the vitreous, and does not have the free extensions of the other form. Its surface is even and has only a moderate prominence.

5. The usual location of the proliferating chorioretinitis is the macula, the papilla and its vicinity.

6. It is almost always accompanied by a focus of pigmentation.

7. It is not accompanied by a detachment following the proliferation which, on the contrary, fastens the retina to the choroid.

The ophthalmoscopic picture of our case presents all the characters described by Lagrange. Anatomically, as pointed out by Lagrange, there occurs the organization of a choroidal hemorrhage following rupture of the choroid and retina, marked by the proliferation of the connective tissue of the choroid. These ruptures are sometimes

accompanied by avulsion, partial or total, of the optic nerve. In our case it may be questioned if there was avulsion of the nerve, or simply peripapillary partial rupture of the retina and choroid. We believe the latter the more probable lesion, because of the distribution of the vessels of the retina being altogether normal. The white spot situated on the nasal side might well be a tear in the choroid.

What is the mechanism of the lesions? Gonin thinks that a blow on the eye can cause a partial avulsion of the optic nerve, indirectly by a sharp rotation of the globe. The optic nerve suffers strong flexion at the level of the scleral ring, and part of the optic fibers are broken. This exaggerated flexion can also produce a rupture of the membranes at the border of the optic disc.

According to Lagrange these lesions may be due to a concussion of the bones of the face. As he says "the eye is lifted up, shaken, in the same manner as a ship is shaken by a ground-swell arising under its bottom. It is quite probable that this concussion of the entire adipose system (or better said of the fatty mass almost fluid at the temperature of the body) is the cause of the ruptures taking place in the inner membrane."

How can we understand that these disorders are often exclusively macular and that when rupture exists elsewhere, the most important lesions are to be found at the posterior pole? It is possible to explain such a localization; first, by the fact that the macular region is the most delicate and the most liable to injuries and traumatisms; secondly, and especially because the eye, shaken, tossed, thrust forward as it is by the oscillating wave arising in the interior of the orbit, is held back, twitched, by the optic nerve firmly fastened to the apex of the orbit.

These twitching motions act chiefly on the entire posterior pole; and, for this reason, the ruptures and hemorrhages are easily produced in this particular spot.

LITERATURE

1. Gonin. Encyclopedia Francaise d'Ophtalmologie.
2. Lagrange. Atlas d'Ophtalmologie de Guerre.
3. Lagrange. Les fracture de l'orbite par projectiles de guerre.

MICROSCOPIC FINDINGS IN A CASE OF ASTEROID HYALITIS.

F. H. VERHOEFF, A.M., M.D.

BOSTON, MASS.

(From the Massachusetts Charitable Eye and Ear Infirmary.)

This reports a case in which the condition was recognized clinically and the eyeball afterward removed for hemorrhagic glaucoma. The histologic examination and microchemic tests seem to indicate that the opacities consist chiefly of calcium soaps and calcium carbonat with some fatty or lipoid substances; and that their formation depends on angiosclerosis, with an altered condition of the blood.

The name asteroid hyalitis was given by Benson in 1894 to a condition in which there occurs within the vitreous humor numerous brilliantly white globular opacities. The condition had been previously recorded in the literature but not recognized as a clinical entity. No doubt it often has been mistaken for synchysis scintillans, from which, however, it is easily distinguishable by the shape of the opacities and the absence of the glistening reflexes characteristic of cholesterol crystals. Holloway[1] has recently collected nine cases of asteroid hyalitis from the literature and added four cases of his own. He summarizes the 13 cases as follows:

"Of these 13 patients, 8 were males and 5 females; 11 were over fifty, 4 of these being over seventy; 1 thirty-five, and 1 was an adult, the age not being stated. In 2 instances there was bilateral involvement; in 7 the right eye only was affected, and in 4, the left eye. As to syphilis, one acknowledged the disease, one had a positive Wassermann, and in three this test was negative; all were presumably serum test. The associated ocular conditions have included lenticular opacities, signs of inflammation of the uveal tract, optic atrophy, and glaucoma, and, if D'Oench's patient be included, detachment of the retina."

I may add that in one case, a bilateral one, there was sclerosis of the retinal vessels and profuse retinal hemorrhages in one eye. In three cases there were foci of old choroiditis. In no case was there evident liquefaction of the vitreous humor.

The case that I have to report seems to be the only one of this condition in which a microscopic examination of the eye has been made and in which the opacities have been subjected to microchemic tests. The diagnosis was made by me from the characteristic vitreous opacities seen when the eye was opened after fixation in formalin. On looking up the clinical record of the case, I found that I had made the same diagnosis one and one-half years previously, when I had made an ophthalmoscopic examination of the patient.

CASE.

Thomas M., aged 75 at the time of operation, was first seen in the Out-Patient Department February 20, 1908, where he was examined for glasses. His vision was, R. +1.75S. =20/20, L. +2.00S. =20/20. No note was made as to the condition of the fundus or vitreous humor at this time.

April 9, 1918, he was seen by Dr. Verhoeff, who made a diagnosis of hemorrhagic retinitis, and asteroid hyalitis, right eye. The vitreous humor was not fluid. The vitreous humor of the left eye was free from asteroid opacities. The vision of the right eye was reduced to the ability to count fingers at three feet, that of the left eye with +2.25 S. was 20/20.

November 23, 1918, the condition of each eye was unchanged. There was no glaucoma.

May 24, 1919, the patient consulted Dr. F. M. Spalding privately, who states that the eyes were free from glaucoma. The vision of the left eye remained unchanged.

December 23, 1919, the patient developed acute glaucoma in the right eye.

December 31, 1919, the right eye was enucleated under local anesthesia by Dr. Spalding, and submitted to Dr. Verhoeff for pathologic examination.

PATHOLOGIC EXAMINATION.

Macroscopic: The globe, after fixation in 10 p. c. formalin, is of normal size and shape, measuring 25½ mm. in its antero-posterior diameter. The cornea is free from opacities. The anterior chamber is normal in depth and free from coagulum. The pupil is 2½ mm. wide. The lens is in situ. The retina and choroid are in situ. The retina shows numerous small punctate hemorrhages, most abundant in the equatorial region. Senile pigmentary changes are present at the ora serrata, but are not unusually conspicuous. The vitreous, normal in consistency, and free from blood, shows in its anterior half multitudes of minute white dots. These are fairly uniformly distributed, but show a tendency to occur in groups.

Microscopic: The cornea, normal; tissue of limbus shows very slight infiltration with chronic inflammatory cells. The root of the iris is firmly united with the ligamentum pectinatum all around. The anterior chamber contains a slight amount of blood adherent to the iris, and also at the bottom of the chamber. The iris is free from cellular infiltration, and shows slight fibrosis, especially at the root, where it is somewhat thinned, and contains a few clump cells. There is no ectropium uveae. A vacularized membrane extends over its anterior surface for about 1 mm. at the periphery, on one side only. There is no pupillary membrane. A few pigment patches on the surface of the lens indicate slight posterior synechiae. The ciliary body is not atrophic. The ciliary processes are congested and many of them show hyalin degeneration of their stroma. The pars plana ciliaris retinae shows very slight (senile) hyperplasia and slight senile pigmentary changes near the ora serrata. The lens shows slight cataractous changes in the anterior and posterior cortex as indicated by the presence of numerous vacuoles containing granules deeply stained in hematoxylin.

The retina shows numerous small hemorrhages in its inner layers, but is free from edema except on the nasal side of the disc where it shows a few characteristic vacuoles. It contains no iron pigment. The macula shows marked changes typical of central senile retinitis. The layer of rods and cones is here completely destroyed while the pigment epithelium shows degenerative and proliferative changes with formation of hyalin tissue. Elsewhere the rods and cones and pigment epithelium are normal, and the latter

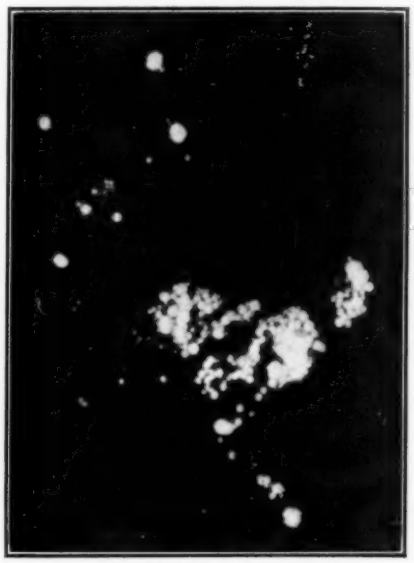


Fig. 1.—Asteroid opacities in vitreous humor as seen by reflected light. This gives a good idea of the ophthalmoscopic appearances.

has formed few if any colloid excrescences. The retinal ganglion cells have everywhere disappeared. The retinal vessels show marked endovasculitis. One vessel is found giving off new formed capillaries into the vitreous humor. In places new capillaries are also forming within the retina.

The optic disc is only slightly cupped. A few new formed capillaries are pushing into the vitreous humor from its surface. Within and behind the lamina cribrosa the optic nerve is completely atrophic and shows marked neurolgia proliferation and slight tendency toward the formation of cavernous spaces. Serial cross sections of the central retinal vessels show complete obstruction of both the artery and vein due to endovasculitis, the vein at

a point about ¼ mm. behind the lamina cribrosa and the artery a little further back.

The choroid shows marked venous congestion, and its vessels show marked endovasculitis affecting especially the smaller arteries, some of which are completely occluded. The chorio-capillaris appears to be intact even behind the macula. The membrane of Bruch shows slight if any evidences of calcification.

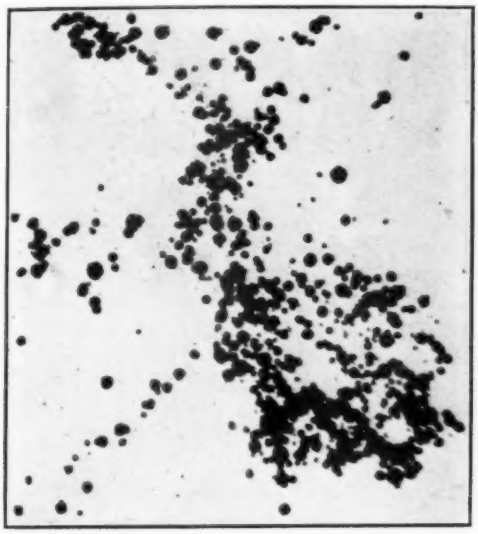


Fig. 2.—Group of asteroid opacities as seen by transmitted light.

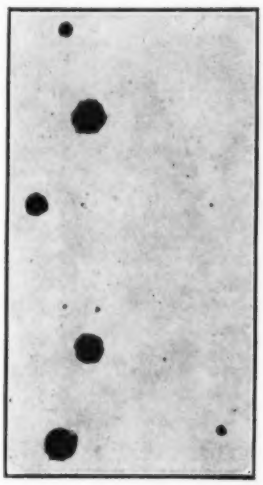


Fig. 3.—Large asteroid opacities as seen by transmitted light.

The vitreous humor is free from blood and serum, and is unusually free from cells, showing only a few stellate epithelioid cells. In ordinary hematoxylin and eosin preparations, numerous faintly staining spherical bodies may be seen in its anterior half. These are far more easily seen in preparations made by placing a drop of vitreous humor on a slide and placing a cover glass over it. In such preparations the bodies appear dark brown with a greenish tinge by transmitted light (Figs. 2 and 3), and brilliantly white by reflected light (Fig. 1). They are scattered thruout the vitreous, but tend to occur in groups of one to three hundred or more. The largest measures .09 mm. in diameter, and they vary in size from this down to a diameter of .009 mm. Some of them are almost exactly spherical in shape but most of them show some slight irregularity in outline. Under the oil immersion lens they appear finely granular, while their outlines present fine spicules suggesting that they contain minute needles.

When the vitreous is dried and mounted in balsam, they become almost invisible by transmitted light and completely invisible by reflected light.

Attempts to crush the balls by pressure of the cover glass or by teasing them with needles, are unsuccessful. The balls are easily seen in unstained celloidin sections mounted in water. In such sections they are never seen in the anterior chamber, or in fact, anterior to the hyaloid membrane, and none is found in contact with the retina or ciliary body.

Staining reactions of the asteroid opacities: The balls fail to stain in eosin, acid fuchsin, carbol fuchsin, carbol-thionin, phosphotungstic acid hematoxylin, Mallory's anilin blue stain, and by Gram's method. They stain slightly after exposure of 20 minutes to a 7 per cent solution of potassium

permanganat. They stain slightly after prolonged exposure to Verhoeff's elastic tissue stain. They stain best after long exposure to a strong solution of alum hematoxylin. The staining however, is not uniform, some of the balls staining intensely, others faintly. In general, the larger the ball the deeper the staining, but some of the large balls stain faintly. The staining of each ball is usually diffuse, no structure being brought out, but there is a tendency for the periphery to stain more strongly than the central portion. Rarely a ball is seen which is composed of smaller balls, each having a diameter of about 20μ.

Solubility: The balls are insoluble in glycerin, alcohol, ether, chloroform, xylol, acetone, concentrated boiling ammonium hydrat, cold glacial acetic acid, concentrated nitric, sulphuric, or hydrochloric acid. They do not dissolve in a 10 per cent solution of potassium hydrat while being evaporated to dryness over a Bunsen flame.

Other microchemic tests: The balls fail to give the protein reaction with Millon's reagent. They also fail to give the Murexid reaction. They do not give the amyloid reaction with Lugol's solution, but stain slightly in this reagent. They fail to stain in a 2 per cent solution of silver nitrat. When treated with cold concentrated nitric acid they abundantly evolve bubbles of gas and are found to have lost their granular appearance when examined in water by transmitted light, and, to reflect much less light when examined by oblique illumination.

When exposed on a glass slide to the heat of a Bunsen flame for one minute they are apparently unaffected, except possibly slightly browned, altho the vitreous tissue with them is charred black.

When treated with concentrated sulphuric acid they fail to give the color reaction characteristic of cholesterol.

When a small drop of vitreous humor containing the balls is dried in air upon a slide and a minute drop of concentrated sulphuric acid applied, bubbles of gas are evolved and after a few minutes the characteristic crystals of calcium sulphat are precipitated in enormous numbers.

When treated with Scharlach R. they give a fairly strong positive test for fat. These tests are made as follows: A small bit of vitreous humor containing the balls is dried in air on a slide. A few drops of a saturated solution of Scharlach R. in equal parts of 70 per cent alcohol and aceton are quickly placed upon them and a cover glass immediately applied. The cover glass is sealed with vaselin to prevent evaporation. The balls begin to stain in about 5 minutes and reach their maximum coloration in about 30 minutes. The same method is successful also with celloidin sections containing the balls. When treated in this way and examined under high magnification, the balls are found to be closely packed with smaller balls, each slightly larger than a red blood corpuscle.

A specimen of vitreous humor containing a large number of balls is dried on a slide and fixed thereto with thin celloidin. Treated with concentrated nitric acid one minute. Washed in distilled water. Allowed to dry. A drop of ether allowed to fall upon it and permitted to evaporate, then another drop of ether allowed to fall upon it and also permitted to evaporate. A solution of Scharlach R. in alcohol-aceton dropped upon it and a cover glass quickly applied. Numerous fat drops stained by Scharlach R. are now found in the vicinity of the balls, and the balls themselves are found to contain smaller balls which also are stained.

In preparations treated with a 2 per cent solution of osmic acid for 24 hours or longer, most of the balls are stained fairly strongly, but none is stained black as in the case of ordinary fat. Some of the balls remain almost, if not quite, unstained.

REMARKS.

With the exception of the unusually late onset of glaucoma, 1½ years after the hemorrhagic retinitis was first observed, and the occurrence of the asteroid opacities, this was a typical case

of hemorrhagic glaucoma due to obstruction of the central retinal vein. The complete obstruction of the central artery no doubt was subsequent to the obstruction of the vein.

The chief interest in this case lies in the vitreous opacities. Seen with the ophthalmoscope, or viewed under the microscope by reflected light, they were identical in appearance with the opacities described by Benson and recently by Holloway. Since they were confined exclusively to the vitreous body, and none was even in contact with other ocular tissues, it is evident that they were not formed within the latter and later excreted, but that they were formed primarily within the vitreous body. The chemical composition of the balls, owing to the relatively small amount of material available, could be determined only with approximate exactness. The test with sulphuric acid showed conclusively that they contained a large proportion of calcium. This was evidenced also by the fact that, in general, they stained strongly in alum hematoxylin, after long exposure to the latter, while the fact that some stained much more strongly than others showed that their calcium content was not uniformly the same.

The fact that the balls evolved bubbles of gas in abundance when treated with strong acids showed that the calcium existed largely as a carbonat, and their failure to stain in nitrat of silver indicated an absence of calcium phosphat. That calcium was not their chief constituent, however, was clear from the fact that after treatment with strong nitric acid they retained their forms altho they were otherwise somewhat altered in appearance.

Their insolubility in ether and other fat solvents excluded free lecithin and cholesterol, but either or both of these substances may have been present in unusually firm and insoluble combinations. The presence of free fatty acids was excluded by the test with copper acetat. The tests with Scharlach R. showed that they contained a small amount of relatively free fat. After treatment with strong nitric acid, a large amount of fat could be dissolved out of them by ether and demonstrated as fat droplets by Scharlach R.

It is safe to conclude, therefore, that the balls consisted chiefly of calcium soap, probably calcium margarat, possibly admixed with insoluble compounds of cholesterol and lecithin.

The question now arises as to the conditions which give rise to these peculiar vitreous opacities. It is well known that fats, fatty acids, lipoids, and lime salts, are apt to be deposited where there is deficient oxygen, for instance, in necrotic infarcts, and in scar tissue where the blood supply is insufficient. They are particularly abundant in old degenerated eyes, notably in eyes with long standing separation of the retina following inflammatory conditions. In these eyes the subretinal fluid is often loaded with such substances. It would seem, therefore, that one of the requirements for the formation of asteroid opacities is deficient oxygen in the vitreous body. This condition no doubt existed in the present case in which the retinal circulation was practically abolished and in which there was marked sclerosis of the choroidal arteries. The advanced age of practically all of the patients, in previously reported cases, suggests that angiosclerosis of the intraocular vessels is the most important factor in all cases.

It is evident, however, that deficiency of oxygen is not always alone sufficient to account for asteroid hyalitis, for I have examined many eyes affected with hemorrhagic glaucoma in which vascular changes were even more marked than in the present case and have hitherto failed to observe such opacities. There must be, therefore, some other factors at work. These may reside in the blood, the latter possibly containing an excess of fats and lipoids in unusual combinations. An altered condition of the blood does not alone suffice to account for the opacities, because the latter were unilateral in all but two of the reported cases.

Holloway assumes that asteroid hyalitis and synchysis scintillans are closely related. This is probably true in a general way, because both evidently depend upon degenerative conditions of the eye. Yet

it is a striking fact that in only one case were cholesterol crystals found in association with asteroid hyalitis, and in this they were few in number.

In the hope of throwing further light upon the question, I examined the subretinal fluid from six degenerated eyes. In all six cholesterol and fatty substances were abundantly present, but in only one eye were there in addition balls identical in appearance with those of asteroid hyalitis. In this eye the fatty material was so abundant as to form a thick mush on the outer surface of the retina, and it was in this mush that the balls were found in large numbers. In the relatively clear serum away from the separated retina the balls were absent although cholesterol was abundant. This observation suggests that in order for asteroid opacities to be formed a delicately balanced combination of factors must exist in the eye.

Conclusions.—The opacities in asteroid hyalitis consist chiefly of calcium soaps, calcium carbonat, and certain amounts of fatty or lipoid substances, in combinations of various grades of stability.

Their formation is usually if not always dependent upon intraocular angiosclerosis in association with an altered condition of the blood.

MOOREN'S ULCER OF THE CORNEA.

MARCUS FEINGOLD, M.D.

NEW ORLEANS, LA.

This is the report of a case in which the eye was removed for pain during the active course of the disease. The eyeball was subjected to careful histologic examinations and photomicrographs of sections made are reproduced. Candidate's Thesis submitted to the American Ophthalmological Society.

Enough cases of Mooren's ulcer of the cornea* have been reported since that first case seen by Bowman, and since the classical clinical picture was created by Mooren, to make the clinical side of the disease, in all its aspects, sufficiently familiar to ophthalmologists. But we are still considerably in the dark as to some sure and successful method of treatment, mainly because the question of etiology is entirely unsolved. A thoro understanding of the underlying histologic changes would greatly advance our knowledge in this direction if we had more and exhaustive histologic reports.

The only authors reporting on this question are: Lawford, Krey, Hillemanns, Schmidt-Rimpler, Asayama, Lister, Kiribuchi, Ogiu, Hayashi, de Schweinitz, Rochat, Ichikawa, Epalza, Mayou, Masuda. Not all of these reports, however, are quite satisfactory because in a disease so often malignantly progressive excision of a small piece of the advancing ulcer edge is of no sufficient help to arrive at the correct understanding of the condition, and because the eye would present only the last stages of the process when its condition would make removal of the whole eye necessary. To add to the knowledge of this side of this strange disease is the purpose of this communication.

CASE HISTORY.

Patient Ben B., farm laborer, colored, aged 28 years, called at the Out Patient department of the Charity Hospital September 5, 1917, complaining that his left eye had been inflamed and the sight failing for one and one half months. At this occasion a small crescent shaped ulcer of the left cornea at the lower nasal limbus was found. Vision R.E. 20/20; L.E. 20/70. He soon absented himself from observation until November 23, 1917, when he returned because the pain in the left eye had been more severe for a week. The left cornea appeared somewhat smaller and irregular in outline and a crescentic ulcer surrounded its lower margin, beginning about 4 mm. above the horizontal meridian on the nasal side and ending about 1 mm. above the horizontal meridian on the temporal side. The ulcer was 2 to 2.5 mm. wide at its widest place, below, and was truly crescentic having narrow pointed ends adjoining the nasal and temporal limbus respectively. Its limbus margin was slightly sinuous; the corneal margin on the other hand, formed an almost continuous uniformly curved line.

The corneal edge of the ulcer was very steep, perpendicular, and gave the impression of being slightly undermined here and there. The floor of the ulcer was uneven and fairly translucent, greyish; here and there, especially near the pointed ends, a small yellowish necrotic mass was seen on the floor; in several places blood vessels from the limbus extended onto the floor of the ulcer. In other places the floor was covered with a thin gelatinous mass like granulation tissue. The remaining cornea was almost perfectly clear excepting for a thin, bluish, faint and uniform opacity at the corneal margin of the ulcer. The epithelium was slightly defective, and this only in the area adjoining the edge of the ulcer. The

*The term "rodent ulcer" without any further qualifications such as Mooren's ought best be avoided as leading to confusion. Thus Davidson's paper on Radium Treatment of Rodent Ulcer (Trans. Ophth. Soc. U. K., 1906, vol. XXVI, p. 303) has erroneously been quoted among the literature of Mooren's ulcer, tho dealing with epithelioma only. "Chronic serpiginous ulcer" is also likely to create confusion.

whole cornea gave the impression as if it had become ectatic and the anterior chamber was deeper below because the thin floor of the ulcer had given away to the intraocular pressure. The cornea was markedly anesthetic. Iris and pupil were apparently normal. Tension normal to palpation. (Fig. 1.) Vision 5/30.

Bacteriologic examination of smear and culture as well as blood Wassermann were negative. No examination for intestinal parasites was made. In spite of various modes of treatment such as Optochin, 1% Balsam of Peru ointment, tincture of iodin, 2% nitrat of silver, electric and thermocautery applied locally at different periods, and internal treatment with mercury and iodides, the condition grew continuously worse and patient suffered intensely at times. More than once did it appear as if the new treatment instituted was going to give good results but the hopes were each time only short lived. For external reasons no transplantation of the conjunctiva could be done.

Fig. 1.—Clinical appearance of Mooren's ulcer of the cornea. Feingold's case.

The ulcer continued to extend more and more around the cornea until only 3 to 4 mm. at the upper limbus appeared intact; at the same time more and more of the cornea, in a central direction, had been destroyed making the ulcer steadily wider while the conjunctiva of the limbus advanced onto the floor of the ulcer in some places. Hypopyon appeared at different times and a pupillary exudate was noted. Vision became reduced to counting fingers at 30 cm. January 25, 1918 the patient experienced the severe pain of perforation of the cornea; on the next day the anterior chamber was shallow, the pupil appeared pear-shaped with the point in the lower nasal quadrant, tho the seat of the perforation was invisible on account of its smallness. Already, January 30, 1918 further invasion of the cornea was again noted and with it return of the severe pain.

The patient's often repeated and insistent demand for enucleation had to be granted February 1, 1918. During the subconjunctival injection of the anesthetic the patient squeezed the lids with the result that iris, lens, vitreous and retina escaped thru the widened perforation in the lower nasal quadrant. Enucleation completed, the eye was immediately placed in Zenker's solution; after hardening it was bisected in the equator and prepared for sectioning after Lee's Dry Celloidin method. Of the anterior half, serial sections were made parallel to the vertical meridian; of the posterior half horizontal sections.

HISTOLOGIC EXAMINATION

The epithelium of the conjunctiva of the eyeball contains a number of goblet cells, becomes more normal at the limbus showing the pigmentation typical for the negro. The conjunctiva contains numerous vessels filled with blood, all with normal walls; no thrombosis anywhere. Large accumulations of plasma cells are seen everywhere; lymphoid cells are much less in evidence and appear either in the form of diffuse arrangement or in the shape of round nodules lying in the midst of the plasma cells; these round foci often show at the same time fine capillaries and a few cells with large, pale and vesicular nuclei. Only single eosinophiles are to be found. Leucocytes are found only near the places where the corneal process is active and here

they are seen lying in the midst of the plasma or lymphoid cells; this relation is best seen near the youngest part of the process. Near the seat of the perforation leucocytes penetrate all layers of the conjunctiva including the epithelium. The conjunctiva has advanced over some portion of the ulcerated cornea covering the thin remaining portion of it unaffected by the process. The sclera shows the typical folding resulting from the collapse of the eye during the operation. Many vessels in the sclera are surrounded by dense plasma cell infiltration while only some show a lymphoid cell mantle. (Fig. 2)*

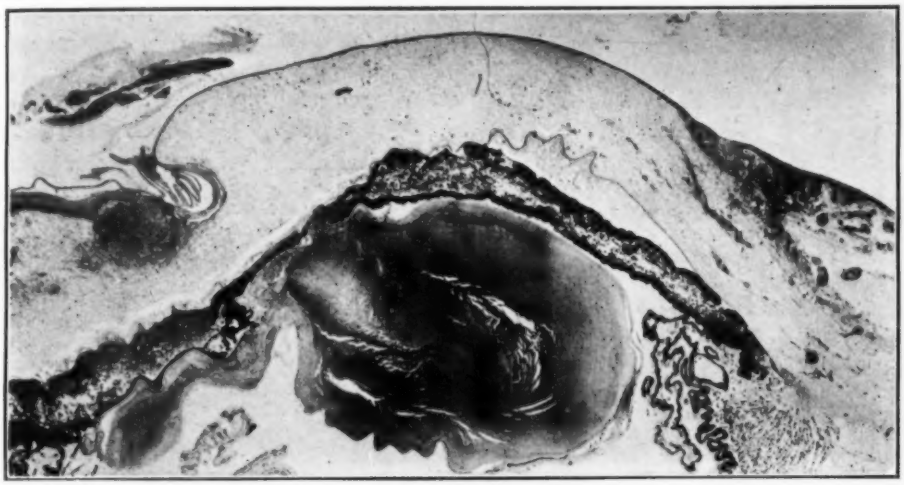


Fig. 2.—Section thru cornea on temporal side of perforation. Above beginning ulcer; below healed ulcer with granulation tissue and giant cells; over-hanging, thickened corneal edge; lens capsule, etc., in front of cornea. X 12.

Owing to the perforation and also to the bulging of the thin, ulcerated cornea the corneal curvature is markedly increased, and the cornea shows the typical folding of the posterior surface. Only in a short area at the upper limbus is the cornea unaffected and continuous with the remaining central portion; the periphery in the other parts of the cornea is occupied by the ulcer, the floor of which consists of a few unaffected posterior layers partly covered by the conjunctiva, while thru a break in the lower nasal quadrant lens, retina and iris project. At the perforation the remaining cornea has a peculiar club-shaped appearance in the cross section due to the fact that the wound portion makes a sharp curve toward the anterior chamber and because at the ulcer edge the cornea has at least twice the normal thickness. The epithelium forms a comparatively even surface leveling the slight irregularities in the cornea and Bowman's membrane. It consists of three to four layers of very flat epithelium in which only the basal layer shows distinct nuclei while the others appear more dry, horny and uniform.

At the ulcer edge the epithelium is often suddenly increased to five or six times in thickness appearing decidedly club-shaped; it covers the corneal edge only loosely; a clear space between it and the underlying cornea exists in several places and it is at times folded back on its self; the cells are irregularly polygonal, succulent and nearly all show distinct nuclei; a few cells are hydropic, edematous and have indistinct nuclei; some are separated by edema here and there and leucocytes lie between others. Bowman's membrane is intact and covers the whole cornea up to the edge of the

*All microphotographs were made by Mr. Max Poser of the Bausch & Lomb Optical Co., to whom thanks are due for his patient skill and unselfish kindness.

ulcer. One or two deep corneal vessels surrounded by lymph cell infiltration are seen near the upper limbus.

The corneal parenchyma stains more deeply in the portion near the limbus and much paler near the edge of the ulcer. This is due to more dense and regular arrangement of the lamellae in the periphery and to the more loose, wavy and separated arrangement of the lamellae in the portion near the ulcer. In addition there is unmistakable waviness, vacuolation and uneven staining within each lamella near the ulcer edge. The corneal corpuscles are slightly more numerous than normal thruout the cornea and higher magnification often shows two or three nuclei in each space which show no very great differences in their staining qualities. This peculiar behavior of the corneal corpuscles and infiltrating cells must apparently be interpreted as a diminished ability to take the nuclear stains, either from partial necrosis or some form of edema. Near the ulcer some of the nuclei are decidedly edematous.

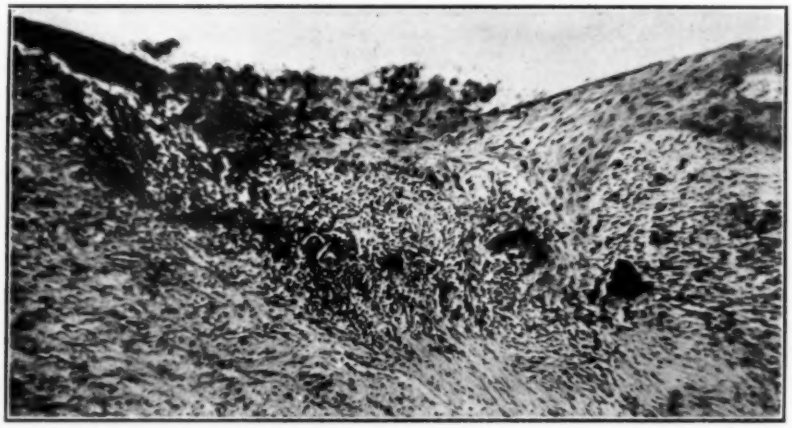


Fig. 3.—Beginning ulcer; epithelium still continuous over infiltration which contains giant cells. X 65.

No marked infiltration with lympho- or leucocytes exists anywhere except, and here only slightly, near the ulcer margin which accounts well for the remarkably faint opacity of the ulcer margin and for the clearness of the whole cornea observed clinically. Near the active and progressing ulcer margin marked infiltration with leucocytes exists, while a short distance from and around the beginning ulcer diffuse and not very dense infiltration with leucocytes can be noticed. In this latter place eosinophiles are rather frequent among the infiltrating cells. All stages of the process can be studied in the different sections, from the very beginning thru the more advanced and more extensive ulcer to the stage of the ulcer healed and covered by the conjunctiva of the eyeball and granulation tissue.

The first beginning can be seen near the upper limbus. (Fig. 3.) Here the epithelium of the limbus becomes somewhat irregular, projections of the epithelium are seen in the depth of the conjunctiva, in the shape of little islands the cells of which are often showing an arrangement bearing a distant resemblance to that found in epithelioma. The cells are slightly separated by edema, small vacuoles appear between them, the nuclei stain less deeply and leucocytes lie between the epithelial cells. Underneath this affected but still unbroken epithelium lies a focus of dense infiltration in the conjunctiva and the adjoining corneal parenchyma, consisting of polymorphonuclear leucocytes with a few lymphocytes and most of the time one or more giant cells at the corneal edge of the focus in the conjunctiva. Some

free red corpuscles between the infiltrating cells seen here may be attributable to the operation.

The cornea appears as if eroded by the infiltration, free blunt ends of the corneal lamellae project into the edge of the focus in the conjunctiva; the lamellae appear fibrillated, teased out and broken up into smaller and thinner layers; leucocyte accumulation extends for a short distance towards the center between the lamellae and their fibrillations.

Soon the epithelium breaks down over the focus, the infiltrated conjunctiva and cornea are at least partially thrown off and an open ulcer is the result. How the process further invaded the cornea in a central direction and how the overhanging edge of the ulcer was produced can be studied excellently in the area near the perforation where new invasion of the cornea was noted on January 30, 1918. Here marked intense infiltration with leucocytes is suddenly seen in the perpendicular corneal edge of the ulcer. From this infiltration a dense band about 1/5 the thickness of the cornea extends in a central direction for about 1 mm. between the anterior and posterior layers of the cornea. At the posterior side of the infiltration the part of the cornea which is continuous with the floor of the ulcer soon shows a slight breaking down —the first beginning of the undermining groove and overhanging edge. Where the process is oldest, in the lower nasal quadrant, all but a very few of the most posterior lamellae have been destroyed; they have resisted the intraocular pressure for quite sometime, until the final breakdown causing the perforation; the wavy teased out and thin ends of the lamellae at the perforation clearly testified to this.

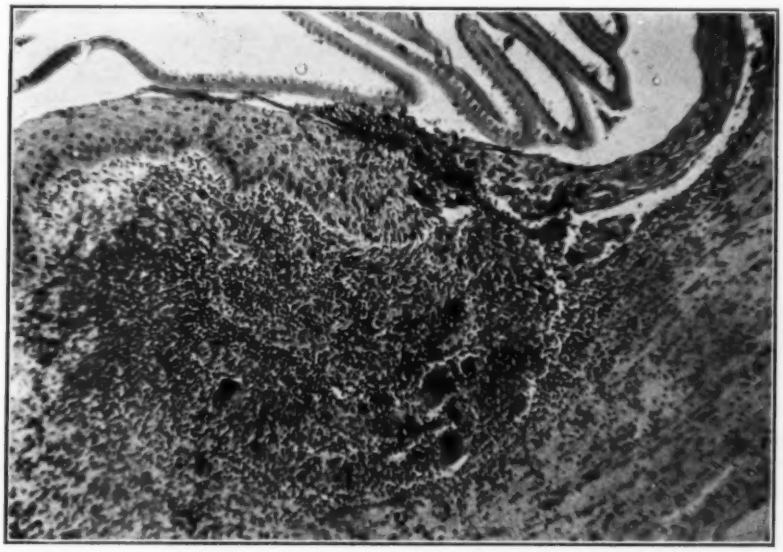


Fig. 4.—Healed ulcer; conjunctival epithelium with granulation tissue cover corneal remnants; giant cells between cornea and granulation tissue. X 65.

Other sections, on the contrary, show arrest of the process, regressive changes and attempts at a cure, all of which had already been noticed clinically. (Fig. 4.) These conditions can be seen both at the limbus and at the corneal side and are somewhat different in details at the two edges of the ulcer. As soon as the oldest ulcer portions, at the limbus, have become cleared of all detritus and necrotic material the infiltration of the remaining cornea diminishes rapidly, and the epithelium of the conjunctiva bulbi begins to cover the floor of the now healing ulcer. As the healing advances towards the center of the cornea numerous capillaries, cells with large vesicular nuclei, lymphoid and plasma cells and one

or more giant cells appear under the epithelium of the portions already covered—real ingrowth of granulation tissue from the conjunctiva of the eyeball. That the epithelium is entirely derived from the conjunctiva of the eyeball is evident not only by its continuity with it but by the appearance of the cells, especially by their marked intercellular bridges (prickle cells).

Close study of the sections proves that epithelium and granulation tissue

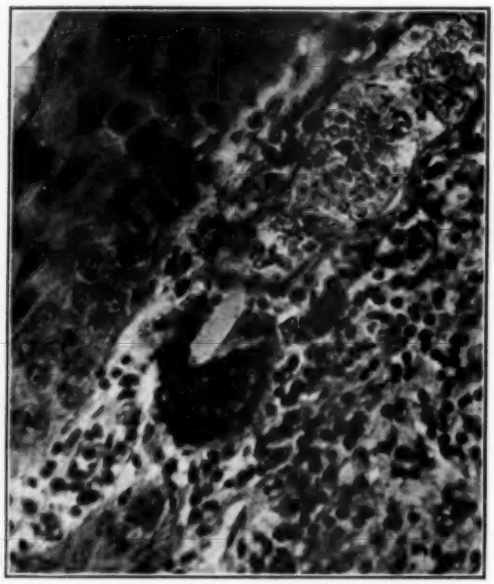


Fig. 5.—Foreign body in giant cell lying immediately beneath epithelium. X 520.

were covering the floor of the ulcer even in those places where clinically the floor of the ulcer appeared clear. Where the corneal edge of the ulcer has cast off all the infiltrating cells, the cornea, as mentioned above, appears decidedly thicker than in the normal periphery, takes the stain less well and the whole structure is decidedly different; the overhanging edge becomes covered by corneal epithelium, which is not permanently adherent to the underlying cornea and is arranged in many layers. These cells are more or less irregular in outline and arrangement and are often hydropic and edematous; they never show any intercellular bridges.

Where the overhanging ulcer edge joins the healed portion one can see the two forms of epithelium, different in character and arrangement, meet and pass into one another thru a very short transitional portion of greatly disarranged irregular cells bearing the characteristics of neither side. (Fig. 4.) Underneath the epithelium the overhanging edge shows a thin intermediary layer of irregularly arranged connective tissue best seen with Mallory's connective tissue stain because staining paler than the adjoining cornea. Adjoining this layer the corneal lamellae end abruptly and contain only few leucocytes between them. Between the free ends of the corneal lamellae and also for some distance towards the center as well as to some extent in the intermediary layer are found triangular, club-shaped, polygonal and spindle like cells, each with a large, well staining nucleus and a large amount of deep staining cytoplasm. Some of these keratoblasts seem to contain more than one nucleus. No mitosis could be found.

The Giant Cells: They are always found in two places only—at the beginning and progressing ulcer (Fig. 3), and at the point where conjunctiva and granulation tissue cover the cleaned floor of the ulcer. (Fig. 4.) No giant cells are seen near the region of the keratoblasts at the healing corneal edge. Up to ten or twelve giant cells are seen in each section. They are always found only at the corneal side of the infiltration in the conjunctiva or of the ingrowing granulation tissue. The cells are small or larger, round, elongated, irregular or polygonal, and have only a few or over twenty deep staining nuclei. Almost all the time the nuclei are marginal; at times they are more in the center. The histologic details lead to no conclusion as to their origin or significance. They show no typical relation to other cells and are seemingly free in the midst of the leuco- and lymphocytes on the corneal side of the exudate or granulation tissue. No cells resembling endothelial cells are found in the infiltration of the incipient ulcer. A few cells were seen which were each enclosing what appeared as a cell with clear vacuolated plasma and no nucleus, apparently a leucocyte. In one instance a homogeneous rod-like, color-

less structure was seen to indent the edge of a giant cell or possibly to lie in it. But this one cell is apparently different from all others, since it was found directly underneath the epithelium at the beginning ulcer (Fig. 5).

THE ENDOTHELIUM shows nothing abnormal. The anterior chamber contains some granular coagulum with leucocytes. The prolapse of the iris in the lower nasal quadrant is covered by a slight amount of fibrinous exudate with numerous leucocytes. Thru the perforation, lens, retina and vitreous have left the interior of the eye and are in part seen to lie in front of the cornea. In the anterior chamber the iris shows the picture of intense hyperemia typical of perforation and two or three small foci of lymphoid cell infiltration. Tho greatly in contact with the cornea at the angle of the anterior chamber the iris does not seem to be adherent there and its position is probably entirely the result of the corneal perforation. In the pupillary area a dense granular exudate covers part of the anterior lens capsule. The lens capsule is normal and only slight disturbance can be made out in the cortical layers of the lens. Ciliary body, retina, choroid and optic nerve offer nothing pathologic, aside from the changes due to perforation such as hyperemia, etc. Staining for bacteria and especially tubercle bacilli was negative.

COMMENT.

The long protracted and relentlessly progressing process in the cornea accompanied by the severe pain observed clinically and the histologic findings leave hardly any doubt as to the classification of the case. It is true Mooren's ulcer is coupled in the minds of most of us with the idea of an ulcer that does not perforate but this notion is only partially correct. Perforation of the ulcer is comparatively rare but undoubted cases of this disease are on record in which perforation had been observed.

The case contains the early beginning of the ulcer and all the histologic details which help us observe the progress of the ulcer from its very incipiency, how the process continues to destroy the cornea in both directions, around the limbus and towards the center, and how parallel with it attempts at healing occur, repair being initiated by the conjunctiva of the eyeball growing onto the floor of the ulcer as soon as the necrotic material had been cast off by the invaded cornea.

No histologic characteristics can be found in the cases so far reported, nor in the present one, to explain why this disease almost always progresses only on the surface of the cornea and only rarely destroys the deepest layers. In Axenfeld's case, reported by Epalza, perforation occurred in consequence of an intercurrent diplobacillary infection. Neither in the case here reported nor in those reported by others has such complication been established. But it is not so difficult to imagine that secondary infection may have occurred with this or some other microorganisms. Negative examinations for bacteria would not greatly speak against such an assumption. In the present case also the corneal remnants in the lower nasal quadrant, tho few and thin, held out for a very long time and gave away to the intraocular pressure only after the process had reduced them greatly in resistant qualities, as shown by the thin wavy ends of the corneal lamellae at the perforation.

As in the case reports of others no etiologic factor could be established in the present instance. The Wassermann was negative as were also the bacteriologic examinations during the illness and of the histologic specimen. While an examination for intestinal parasites was omitted, it must be borne in mind that the coincidence of such parasites and Mooren's ulcer in the case of Hayashi is to be looked upon as a mere coincidence owing to the frequency of intestinal parasites in Japan. The eosinophilia found in the present case was only of a very slight degree and only in an area surrounding the beginning ulcer. The general health of the patient seemed extremely good, and no special search for tuberculosis was made. The case report of Mori, only accessible in the title, might

possibly contain pointers in the direction of tuberculosis having some relation to the disease.

The histologic details in the case show many features in common with the cases already on record, but at least one new feature can be added to the histologic picture of the disease by this report. The most striking detail of the case is undoubtedly formed by the abundant number of giant cells found in each section. It is to be borne in mind that they are already found in the earliest beginning of the infiltration, where they occupy a position between the infiltration in the conjunctiva and the affected cornea, and also in the places where conjunctiva and granulation tissue had advanced onto the floor of the ulcer. But they are conspicuously absent at the corneal edge of the ulcer where the cornea had become entirely cleared of necrotic material and invading leucocytes. They seem to lie free in the midst of the tissues, almost riding on the ends of the corneal lamellae and there is no characteristic arrangement of the tissue elements around them. Absence of endothelial cells is especially noticeable near them, they are surrounded by lymphocytes and leucocytes only.

Necrosis in the form of diminished staining qualities is entirely absent in all places where giant cells are found. The presence of the giant cells may possibly indicate some scavenger function of these cells. This would explain their presence in the only two places mentioned: At the beginning ulcer they would lie at the blunt free end of the corneal lamellae in the act of carrying off detritus from these tissues while at the more healed places where the conjunctiva had grown over, their presence would indicate that tho the conjunctiva had already grown over the cornea the detritus had not been entirely cleared away before that had occurred. Their presence in the second place will also explain partly why the healing in all the cases reported is so often interrupted by relapses if we assume that the advancing conjunctiva had migrated onto the cornea too hastily, so to say, before the cornea had been entirely cleared of all necrotic material and of all microorganisms which we must assume to cause the disease. From such islands still containing the supposed virulent microorganisms fresh infection in a central direction can be imagined to occur, because the avascular cornea can resist poorly; the healed and covered over portion can resist a fresh attack better, and can even overcome it because of the vascularity of the granulation tissue. This of course gives no explanation why the process advances first in the deeper layers producing the undermined edges and why the most posterior layers are in most cases so immune to the process. The undermining of the conjunctiva bulbi first observed by Gifford might possibly be explained as an unusually tenacious process, where destruction extended onto the sclerotic from just such infected islands, in spite of the adjoining vascularization and granulation tissue.

A lesson as to the method of treatment might possibly be derived from the presence of the giant cells. If the above explanation corresponds to the facts as to the invasion then thoro destruction of all invaded cornea and sclerotic must be practiced. Even the portions already covered by conjunctiva and granulation tissue must not be spared if we want to destroy all seed for any further spread of the disease. We would thus have the theoretic explanation for the empirically adopted and fairly successful method of treatment by excision, curettage and cauterization. If healthy mucous membrane, such as from the lips, vagina or prepuce, could be transplanted onto a cornea and sclera thus thoroly disinfected it might prove preferable to the conjunctiva bulbi, which is always likely to be contaminated with the causative microorganism.

The paper of Koeppe, "Ueb. Heil. zw. Faelle v. Ulc. rod. Corn. durch Tuberkulininjekt. nebst. Bemerk, ueb. d. mikroskop.-anatom. Unters. e. dritt. Falles," Zeitschr. f. Augenh. XXXVIII, 1917, p. 301, was not available, due to conditions resulting from the war, until some time after the paper had been finished.

BIBLIOGRAPHY.

(The complete bibliography up to 1902, excepting Wachtler's paper, also excellent abstracts of all the cases may be found in Nettleship's article.)

1901. Wachtler. Augenaerztl. Mittheil. (Ulcus rod. corn.). Wien. med. Wochenschr. No. 2, and Ulcus rodens bei Tabes mit Sehnervenatroph. (Quoted after Nagel's Jahresber. f. O., XXXIII, 1901, p. 499).

1902. Nettelship, E. Chronic serpiginous ulcer of the cornea (Mooren's ulcer). Trans. Ophthal. Soc. U. K., XX, 1902, p. 103.
Chesneau. Pathogenie de l'ulcus corneae rodens. Bull. et Mém. Soc. Franç. d'Opht., XIX, 1902, p. 349.
Collins, E. Treacher. A case in which Mooren's "rodent ulcer" had six years previously involved the whole surface of each cornea. Trans. Ophth. Soc. U. K., XX, 1902, p. 144.
Fisher, J. Herbert. Mooren's ulcer. Trans. Ophth. Soc. U. K., XX, 1902, p. 147.
Handmann. Zur Behandlung des Ulcus corn. rod., Klin. Monatsbl. f. Augenh., XL, 1902, I, p. 221.
Pflueger. Ulcus rodens corneae. Corr.-Bl. f. Schweiz. Aerzte. March 15. (Quoted after Nagel's Jahresber. f. O. XXXIII, 1902, p. 552).
Taylor, S. Johnson. Notes of a case of rodent ulcer of the cornea in a child. Trans. Ophth. Soc. U. K., XX, 1902, p. 98.

1903. Asayama. Rodent ulcer of the cornea. Annals of Ophthalm. XII, 1903, p. 364.
de Bono, Terapia dell' ulcera rodente della cornea. Clin. oculistica Gennajo. (Quoted after Nagel's Jahresber. f. O., XXXIV, 1903, p. 587).
Lister, W. T. A pathological report on a case of Mooren's ulcer of the cornea. Roy. Lond. Ophth. Hosp. Rep., XV, p. 352.
McKeown, D. A case of chronic ulcer of the cornea. Am. Journ. Ophth., XX, 1903, p. 45. (Brit. Med. Journ.).

1905. Kiribuchi. Japan. ophth. Journ. vol. IX, 1905. (Quoted after Hayashi).
Nettleship, E. Note on prognosis in chronic serpiginous ulcer (Mooren's ulcer) of the cornea. Trans. Ophth. Soc. U. K. 1905, p. 64.
Wanner. Zwei Faelle von Ulcus rodens. Ophth. Klinik. IX, 1905, p. 210.

1906. de Berardinis. L'ulcera rodente della cornea curata mediante la eteroplastia die tessuto cornealo die coniglio. Annali di Ottal., XXXV, p. 835. (Quoted after Nagel's Jahresber. f. O., XXXVII, 1906, p. 524, and Ophthalmic Year Book, IV, 1907, p. 145).
Sgrosso, E. L'eteroplastia corneale nella cura dell' ulcus rodens della cornea. Archiv. di Ottalm. XIV, p. 307. (Quoted after Nagel's Jahresber. f. O., XXXVII, 1906, p. 524).

1907. Axenfeld, Th., Zur chron. periph. Rinnenbild. d. Kornea. Klin. Monatsbl. f. Augenh., XLV, 1907, II, p. 578. (Mooren's ulcer developed in each cornea).
Ogiu, Japan. ophth. Journ. vol XI, 1907. (Quoted after Hayashi).

1908. Hayashi, M. Ueber d. Ulcus rod. corn. Klin. Monatsbl. f. Augenh. XLVI, 1908, II, p. 497.
Stevens, E. W. Mooren's ulcer of the cornea. Ophthalmic Record, XVII, 1908, p. 198.

1909. Randolph, R. L. Rodent ulcer of the cornea (Mooren's ulcer). Trans. Sect. Ophth. A. M. A. 1909, p. 308.
Rubert. Ulc. corn. rod. (Mooren). Westn. ophth. 1909, XI. (Quoted after Klin. Monatsbl. f. Augenh. XLVIII, 1910, II, p. 716).
Weigelin. Ueber Ulcus rod. Klin. Monatsbl. f. Augenh. XLVII, 1909, II, p. 118.

1910. Taylor, H. P. and Jones, H. L. Treatment by ionization or cataphoresis. Brit. Med.-Chir. Journ. (Quoted after Ophthalmic Year Book, VII, 1910, p. 150).

1911. Gallemaerts. Rodent ulcer. Bull. de la Soc. Belge d'Opht. No. 28, p. 16. (Quoted after Ophth. Year Book, VIII, 1911, p. 122).
Jones, H. L. Treatment of corneal ulcers by zinc ions. Brit. Med. Journ. II, p. 526. (Quoted after Ophth. Year Book, VIII, 1911, p. 118).
Rochat. Ulcus corneae rodens (Mooren). Nederl. Tijdschr. v. Geneesk, II, p. 285. (Quoted after Nagel's Jahresber. f. O. XLII, 1911, p. 612).
de Schweinitz, G. E. Rodent ulcer of the cornea, with histological demonstration. Sect. on Ophth. College of Physic. Phila. Ophthalm. Record, XX, 1911, p. 83. Annals of Ophth. XX, 1911, p. 436.

1912. Hidaka, K. Ulcus rodens. Annals of Ophth. XXI, 1912, p. 372.
Kuhnt. Destruierende Hornhautprozesse. Deutsch. med. Wochenschr. 1913, p. 45. (Quoted after Nagel's Jahresber. f. O., XLII, 1911, p. 612).
Parsons, H. A case of Mooren's ulcer with ulceration of the sclerotic. Ophthalmic Review, XXXI, 1912, p. 383. (Roy. Soc. Med., Sect. Ophth.).
Peters, A. Rosaceakeratitis und Ulcus rodens. Klin. Monatsbl. f. Augenh. L., 1912, II, p. 490.
Starr, E. G. The use of a conjunctival flap in the treatment of corneal infections and of pannus. Trans. Am. Acad. Ophth. and Oto-Laryng. 1912, p. 171.

1913. Ichikawa, K. Ein Beitrag z. Pathol. d. Ulc. rod. corn. Klin. Monatsbl. f. Augenh. LI, 1913, II, p. 84.

1914. Lindner, E. Ulc. corn. rod. u. Rosacea-Keratit. (Ein Vergleich). Inaug.-Dissert. Rostock. 1914. Klin. Monatsbl. f. Augenh. LII, 1914, I, p. 577.
Uhthoff, W. Ein Fall v. typ. Ulc. corn. rod. (Mooren) auf beid. Augen. Klin. Monatsbl. f. Augenh. LIII, 1914, II, p. 229.

1915. Epalza, E. Ein Beitrag z. Klin. u. path. Anatom. d. Ulc. corn. rod., Klin. Monatsbl. f. Augenh. LIV, 1915, p. 266.
Marcard. Mooren's rodent ulcer of the cornea. Arch. d'Opht. XXXIV, p. 157. (Quoted after Ophth. Year Book XII, 1915, p. 111).
Mayou, Stephen. Chron. serpig. ulcer of the cornea (Mooren's ulcer). Ophthalmoscope, XIII, 1915, p. 438.

1916. Masuda. Path. anat. of rodent ulc. of the corn. Nippon Gank. Zash. Aug. 1916. (Quoted after Ophthalmology, XIII, 1915-16, p. 870).

1917. Shannon. Mooren's ulcer four months after the eye was pronounced well. Arch. of Ophth., XLVI, 1917, p. 167.
Tyrrell, F. A. C. Case of Mooren's ulcer treated with a conjunctival flap. Trans. Ophth. Soc. U. K., XXXVII, 1917, p. 205.
Mori. Tuberculosis of bulbar conjunctiva with corneal rodent ulcer. Nippon Gank. Zashi, Feb., April, 1917. (Quoted after Ophthalmic Literature, VII, 1917, p. 124).

MICROSCOPY OF THE LIVING EYE WITH THE SLIT LAMP OF GULLSTRAND.

ROBERT VON DER HEYDT, M.D.

CHICAGO, ILLINOIS.

This paper calls attention to the method of examining the eyes by the corneal microscope under illumination of the Gullstrand slit lamp. It gives a review of the most striking phenomena revealed by this method of examination. Read before the Chicago Ophthalmological Society, November 15, 1920.

The introduction of the slit lamp by Alvar Gullstrand in 1911 has opened an entirely new field for diagnosis and clinical observation to ophthalmology. The literature has been enriched by hundreds of reports by more than a score of investigators in this new line of research.

Foremost among these are L. Koeppe of Halle, and A. Vogt of the University of Basel. The latter has in preparation an atlas showing in 376 or more illustrations, most of them microphotographs in colors, various normal and pathologic conditions, heretofore established only anatomically, which may now be directly observed in the living eye. Many new facts have been established which were unknown, or not demonstrated. Owing to the delicacy of the anatomic parts, the latter were at times destroyed in the process of fixation, or we were unable to further differentiate their detail by any method of staining. The text of this atlas has been translated into Italian by Verderame, into French by Koby and Darier, and during the past year I have had the privilege of translating it into English, for the author.

Corneal microscopes, monocular as well as binocular, have been obtainable for many years, but owing to the imperfect and low degree of illumination furnished, have had but a limited field of usefulness. The stereoscopic binocular microscope now has attained full practical value by being combined with the slit lamp of Gullstrand. This combination of the two instruments is an achievement of Prof. Henker of the firm of Carl Zeiss.

The types of illumination adapted to the slit lamp have been of several kinds. The Nernst filament has until recently been used by most investigators. Vogt has also adapted an arclight. Lately another type, the Wolfram spiral, enclosed in a bulb containing nitrogen, has been utilized, because of its greater intensity of light.

The light after passing thru a double lens is focussed onto a narrow slit diaphragm. It then passes thru a larger diaphragm and lens of about 7 cm. focal power, and by this is projected onto the eye. By these means the concentrated, nearly homogeneous, sharply circumscribed, quadrilateral beam of light, is practically freed of aberration.

By the means of various combinations of oculars and objectives with the microscope a series of magnifications of the area under observation, ranging from 9 to 108 times may be attained. With the highest magnification, however, the physiologic oscillation of the eyeball becomes objectionable and interferes somewhat with accurate observation.

The microscope is mounted on a base adjustable forward and backward, as well as from side to side, by rack and pinion. Chin support and head rest for the patient are essential.

Various methods of observation have been used.

By direct focal illumination the tissues appear in their natural coloration and form.

In diaphanoscopy the tissues are transilluminated by reflection of the light from a surface beyond the object under observation. Vogt also has described very fully the study of the reflected image of the light on the various limiting surfaces of the media, such as the anterior and posterior surfaces of the cornea, the lens and capsular surfaces, and the several nuclear limiting areas within the lens.

These reflections of light from limiting surfaces are often seen when using the ordinary ophthalmoscope, and especially the reflection on the anterior corneal surface is considered an annoyance. With the slit lamp method they may, however, assume a sphere of decided usefulness. When a microscope is exactly focused onto them they disclose a world of information regarding the minute structure of these various limiting surfaces.

Microscopic measurements of the size of objects and the exact determination of their depth within the various media is now possible.

Koeppe has applied a contact glass to the eyeball, wherewith the curvature of the cornea is eliminated. In this way the retina may be studied stereo-microscopically under a magnification as high as 70 times, and the angle of the anterior chamber under one of 40 diameters. By the insertion of two Nicol prisms Koeppe also makes observation in linear polarized light.

I will now give an abbreviated outline of some of the findings made with these new instruments, many of which I have recently been able to verify.

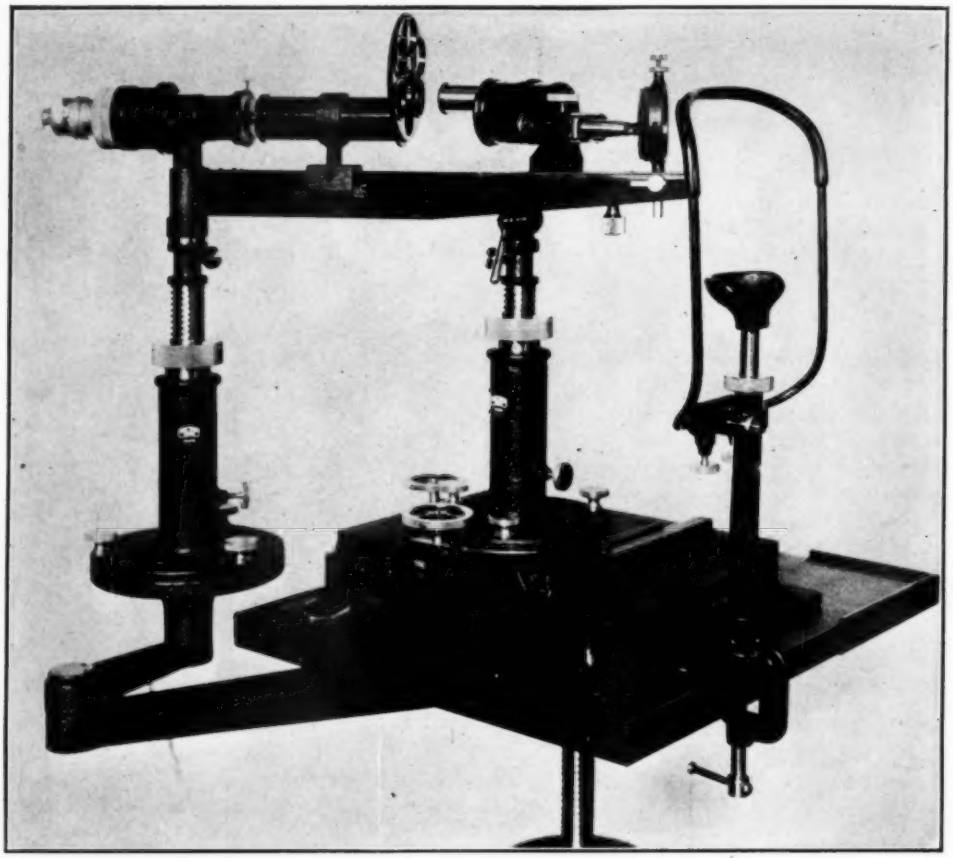


Fig. 1.—Combination of corneal microscope (on column in center). Slit lamp (on column to the left). Both directed towards face rest on the right.

The limbus presents a whorl of vascular loops and arcades, with their convexity toward the cornea. The greater part of these vessels are normally empty. By transillumination the blood current may be easily seen under high magnification. At times in certain vessels, the current comes to a standstill and it has been seen to reverse itself.

In manv individuals, especially below the cornea, there is a radiating series of straight tubular structures, which Vogt has termed the palisades. They each contain a vessel, a vas afferens, and represent the superficial arterial pathway to the vascular loops at the limbus.

At the corneal border a physiologic dew-like infiltration of the cornea may be noted. This is composed of fine droplets about the size of the epithelial cells. According to Vogt this phenomenon in all probability represents an increased saturation of the peripheral epithelial layer with a nutrient fluid.

Isolated areas of dew-like changes on and in the epithelial and endothelial layers of the cornea are common pathologic findings, seen with the slit lamp.

When focussing onto the cornea, the anterior surface manifests its approach by the appearance of small ringlets and dots, which are movable. These are the corpuscular elements in the lacrimal fluid, and they may be greatly increased in numbers by rubbing the eyelids. The corneal substance, owing to its varied anatomic components which latter all present different refractive indices to one another, is diffusely luminous. This luminosity increases with age,

Within the corneal substance, superficial and medial, never in the deep layers, are the nerve fibers. They as a rule are dichotomously branched and often show a medullation for a short distance inward from the limbus.

Of the precipitates on the posterior corneal wall and of the clouding of the aqueous in iridocyclitis pages of descriptive matter could be written. The beauty of synechia can only be appreciated when seen. I have had the opportunity to carefully examine many cases of this kind stereomicroscopically under as high as a 40 times magnification, with the slit lamp.

In a case of nearly quiescent interstitial keratitis I saw numerous long blood vessels within the corneal substance. Most of these were empty. In one larger vein I saw the blood as it flowed, and could see each and every individual red cell as it rolled along. In the reflex image of the posterior corneal wall I could see the endothelium, each individual living hexagonal cell, forming a yellowish mosaic.

Vogt has noted an increase in the opacification of that corneal zone, which is later involved by the arcus senilis, as early as after the third decade of life. A fully developed arcus senilis shows that the lucid interval which separates the gerontoxon from the limbus, is clear only in the superficial corneal area. The opacification of the deeper area is continuous to the limbus.

The vascularization from the limbus extends into the superficial zone only, hence its prolonged immunity to clouding.

In iridocyclitis I have seen glassy tenacious droplets extruding themselves, especially at the pupillary border. F. Schieck has reported an exhaustive study of these changes within the anterior chamber. In cases of serous iridocyclitis he describes small glassy pears, which form masses like frog eggs, or they may be so delicate as to appear as a spider web like cloud. This sticky material interferes with the outflow of the aqueous thru the pectinate ligament into Schlemm's canal, hence the tendency to secondary glaucoma, manifested by the deepening of the anterior chamber and tension, in this type of inflammation.

One of the most beautiful phenomena I have seen with the slit lamp is the process of dilatation and contraction of the pupil under low power. The rounded edge of the pupillary border is rolled in and out somewhat as when a curtain is wound over a pole. During dilatation for instance, posterior areas appear from behind the pupil, and roll forward onto the iris, on account of the contraction of the superficial muscles. The stroma is most artistic in its balcony and lattice-like formation when seen in the perspective.

A depigmentation of the pupillary cells of the iris, so that over large areas the pigment has been denuded, leaving only a pigment free, honey-comb-like hollow framework, or translucent crust

is described. Part of this pigment is precipitated to the angle of the anterior chamber, and this process has been construed as predisposing to glaucoma by Koeppe.

Vogt, however, is certain that this depigmentation is a senile phenomenon and describes the development of newly formed islands of pigment deposit under the stroma as part of this process. I have seen several cases showing this depigmentation in certain areas.

With slit lamp illumination senile cataract manifests itself in its incipiency by an iridescence of the layer directly under the capsule, and those bounding the senile and embryonic nuclei. Senile changes are not subcapsular as is generally supposed, but involve the whole of the cortex. In most cases the nucleus remains comparatively clear, so that apparently fully mature cataracts may be opaque only in the cortical substance. In very advanced cases a subcapsular surface area containing vacuoles is discernible.

A sharp point of differentiation between senile cataract and complicated cataract has been brought out by Vogt, by the aid of the slit lamp. Complicated cataract in its very incipiency shows a posterior subcapsular iridescence, and at times later an anterior subcapsular iridescence. These changes are found long before we can see any clinically diagnosable changes in the dish-pan area under the posterior capsule, by focal light with the ophthalmoscope.

The difference between the progression of senile and complicated cataract is that the latter after its incipiency under the posterior capsule, involves the balance of the lens substance in a manner described as a creeping forward, irrespective of anatomic lines.

Most beautiful are the remnants of the embryonic vessels on the posterior lens capsule. If properly focused they may be seen in every human eye. Also in conjunction with this it is noted that the attachment of the hyaloid artery is not in the lens center but somewhat nasal and downward, corresponding anatomically in that respect to the displacement of the entrance of the optic nerve on the back of the eyeball.

In the vitreous we see a definite supporting structure. Exudative deposits and blood remnants are suspended in this and on movement of the eyeball the whole mass is set into motion. After the eyeball has come to rest, they, however, are seen to return to their definite original location.

By using the contact glass of Koeppe over the eyeball, I have been able to see the fundus stereomicroscopically under a magnification of about 40 times. The crossing of the retinal vessels one above the other is beautifully seen in the perspective. In cases of retinitis pigmentosa Koeppe has ascertained that the pigment may wander into the vitreous.

By these new methods of clinical observation I am sure many new facts will be disclosed. Of its importance to ophthalmology, this very superficial outline will have given abundant evidence. I will be glad of the opportunity to cooperate with any of my colleagues in the study of suitable cases.

CONTRIBUTION TO THE STUDY OF ONCHOCERCOSIS.

R. PACHECO-LUNA, M.D.

GUATEMALA, C. A.

Previous papers on this condition are here summarized. The form of filaria causing it is described with its appearances as found in the body and its life history so far as known. The extraocular manifestations of onchocercosis are given, and then the ocular lesions. The latter are divided into more or less distinct clinical forms which are illustrated by diagrams and pictures of lesions and cases. Translated for this Journal by Jean Matteson.

The California State Medical Journal published an article on "Ocular Complications in an Epidemic of Filaria Onchocerca," written by Mr. William Thomas Fee,[1] ex-consul of the United States to Guatemala. Undoubtedly due to the fact that the author is not a doctor, the article contains some inaccuracies and seems rather to have been written for a lay magazine than for doctors of medicine, to whom it is addressed and presented in an important medical journal. We have been interested in various articles,[2-5] concerning the ocular manifestations which we have been able to observe in those affected with onchocercosis tumors, and are not willing to approve by our silence many of the conceptions which it contains. For this reason we feel compelled to report what has been learned up to the present time upon a subject as interesting as it is new.

By the name of Onchocercosis is understood a new nosological entity, characterized by the formation of a subcutaneous tumor, distinctly limited, containing a filarial Onchocerca sp. whose principal symptomology is shown thru disturbances of the eye.

For some time the colleagues who practice on the Pacific coast, made a decided distinction between the true Erysipelas and "Coast Erysipelas," on account of their having different characteristics. The tumors of the latter were known, but taken for sebaceous cysts of the scalp. Respecting the disturbance of the sight they thought it was occasioned by a very different cause. They considered it one of the calamities of the rich territories; and very often they sent to this city a number of blind people, choosing the most advanced cases. Both Don Domingo Alvarez, our illustrious predecessor in the service of ophthalmology in the General Hospital, and ourselves had the opportunity to have these patients, but both of us failed to understand the real nature of the infection.

To Dr. don Rodolfo Robles is due the unmistakable merit of having discovered, that the disease known by the name of "Coast Erysipelas" is produced by a filaria which is enclosed in the tumors; and of having discovered the intimate relation which exists between the parasite and the clinical symptoms. Our distinguished colleague honored us by committing to us the study of the ocular manifestations, and in various articles we have tried to explain the results of our investigations.

Onchocercosis exists in an endemic form in an extensive strip of land having an altitude of 2,000 to 4,000 feet, along the coast of the Pacific in the Republic of Guatemala. It is supposed that it passes the frontiers of Mexico and Salvador; unfortunately we are lacking all the data in respect to this, as there has been no case published in those adjacent countries, whose inhabitants as a whole have the same conditions of life and customs as ours.

The parasite is a Filaria of the Onchocerca type, its species doubtful. At first they thought they had to do with the known species, Onchocerca Volvulus, Leuckart, 1893, (Castro Villafane), on account of the microscopic resemblance between the tumors of the two species. We, on account of ocular symptoms, thought at first that it had to do with a different species, as they could not have passed unnoticed by authors who did not mention them in the descriptions which they give in their writings. The brilliant studies which Molina Izquierdo and R. Morales are bringing to a successful end, tend to demonstrate that, in fact, we are dealing with a new species; on account of the important zoologic characteristics

which they have encountered which differ in many points from the already known species.

M. Morales calls the new parasite "Onchocerca" and as the result of his studies he has the firm conviction that the species is entirely new. The different characteristics which figure in the comparison are sufficient to convince one that it has nothing to do with the Onchocerca Volvulus, Leuckart, 1893, but is a new species, and, if to this is added the multiple manifestations produced by the parasite, and not described by any author up to the present time, the conviction is still stronger.

Following we copy the characteristics of the well known species Onchocerca Volvulus, Leuckart, 1893, and the characteristics of the new species, Onchocerca sp. found by Dr. Morales.

TABLE I.

Onchocerca Volvulus, Leuckart, 1893.	*Onchocerca, Species New.*
EGGS: Translucent, provided with a prolongation at each end, comparable to an orange enveloped in a paper twisted at the extremities. (Construction in fact, characteristic of the Onchocerca Volvulus, Le Dantec).	EGGS: Translucent, spherical and oval, of 48 to 56 microns. The embryo sees perfectly in all periods of its evolution.
EMBRYO: Measures 300 microns in length. Has no sheath, tail sharp, a spot on the anterior fifth of the body.	EMBRYO: Measures 240 to 270 microns in length by 6 in width, has no sheath, tail sharp, clear space in the cephalic region (cephalic lacuna), another at the union of the anterior 40th and two with the central part posteriorly very near to each other. These clear spaces are formed by the interruption of the cellular column, without taking a V form.
MALE: From 3 to 3½ cm. long and 140 microns wide, thread-like, extremities pointed cuticle grooved, digestive tube straight, and subterminal mouth defenseless, 3 pairs of papillas at each side of the large intestine, 3 pairs of post-anals, 2 unequal spicules projecting outside of the large intestine, tail very curved, generally turned back over itself.	MALE: About 23 mm. long, thread-like extremities pointed, cuticle grooved. There are no papillae nor pre- nor post-anus[2], one anterior spicule, long, thread-like in its free extremity, and the posterior spicule terminates in a mass. The first is copulative, the second accessory. When the copulative spicule is inside of the large intestine it makes with the accessory spicule the form of a V with unequal curved branches and when outside of the large intestine it takes the form of a Y. The curved tail is spiral.
FEMALE: 6 to 7 cm. long and 360 microns wide, tail curved, uterus 700 microns, at the anterior extremity.	FEMALE: 12, 15 and up to 28 cm. according to the subject. Uterus 440 to 500 microns, from the front, tail curved.

Molina Izquierdo[6] has also the firm conviction that the parasite belongs to a new species. The distinctive characteristics which he found have been published with all their details in the AMERICAN JOURNAL OF OPHTHALMOLOGY in the issue of April, 1919.

The tumors are found most frequently situated in the cellular tissue underneath the scalp (Figs. 4 and 5); and are distinguished by the place they occupy in the head, the consistency which they have and their size and the form, from the sebaceous cysts which are de-

veloped in that region, and with which they were confounded. Their size varies, (Fig. 5). The smallest which it is possible to locate is the size of a grain of rice, the largest reach the dimensions of an almond; and when there are a number joined together they have the volume of a mandarin orange. But ordinarily they are no larger than a bean (Vicia faba, L.) to which they bear a great resem-

Fig. 1.—Embryo of onchocerca 48 to 45 μ in diameter.

blance. They are of an elliptical form, presenting two flat surfaces, a form which they take owing to the pressure to which they are subjected, being pressed by flat resisting surfaces. Some-

Fig. 2.—Microfilaria of the onchocerca, 240 to 270 μ long and 14 μ broad.

times they are found in other parts of the body, and take the globular form when they are not pressed against a bony surface.

The dissection of these tumors presents no difficulties, because they are perfectly defined, and do not adhere to the neighboring tissues. Frequently they lie upon an excavated surface in the bony plate of the cranium and the meninges palpitating in the back gives the same impression as if they had been made purposely with a trephine crown.

The tumor, properly speaking, is composed of a bell-like formation in an inextricable net of one or of various filarias in a vascular conjunction of new formation. In this tissue cavities abound, in which are found embryos, when male and female exist united in the same tumor.

Fig. 3.—Head of onchocerca.

It does not happen when there are found only single examples of the one sex. This makes us believe that the filarias are developed, live and die in the same tumor. It is impossible to dissect the tumors with needles because the result is that the filarias stretch, are deformed and end by breaking. The only way complete specimens are obtained is by digesting the tumor in artificial gastric juice. Care must be taken to regulate and maintain it at the temperature of the human body.

Fig. 4.—Tail of onchocerca. Male 23 mm. long.

Using this method, Molina Izquierdo succeeded in obtaining the first entire filaria, the most beautiful male example which we had seen.

The carrier which serves for the contagion has not been discovered, notwithstanding that Drs. R. Robles, R. Morales and Calderon have occupied themselves with the study. We suspect that like all other filarias better known, there must exist a provisional host for the species, which occupies our attention, in whose organism the embryo undergoes a phase

of its evolution, until the larva is in condition to penetrate the subject, in order to arrive at the adult stage. In the Draconculosis are small crustacea the cicoples in which part of the evolution is effected, and man is infected by drinking the water which contains them. They penetrate the organism thru the mouth, are carried to the stomach where the juices digest the crustacea, and the

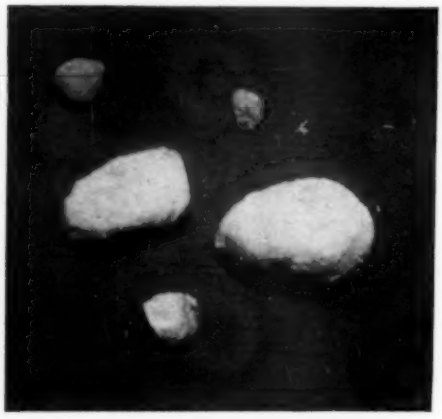


Fig. 5.—Onchocerca sp. Tumors life size.

freed larva emigrate to the subcutaneous cellular tissue. In Filariosis various species of mosquitoes serve as carriers. The kind which sting the man when he is asleep and inoculate the larvae below the skin, which larvae reach the lymphatic glands where they soon reach the adult state.

In Onchocercosis, we repeat, the transmitting agent is still unknown, but although the embryos have not been found in the blood, there are reasons for believing that the inoculation is made by the bite of certain blood-sucking insects. It is not possible to think that it may be from the water, on account of the clean demarcation of the infected zone, a zone which is crossed by rivers which rise and empty in territories outside of these limits and which remain invariably safe. To confirm this statement we know estates in which the disease is unknown, nevertheless all their water is received from the infected district.

In the infected zones the majority of the inhabitants are infected. The rich and poor alike, the laborer and the landlord. Sex does not count. We have seen children at the breast, of four months, that presented the complete clinical syndrome. Interesting observations, from the view of social class, are of a boy of ten years, the only son of a German proprietor of a beautiful property. Another of the administrator of an important agricultural property in the zone of Yepocapa, which is published in full in our first communication.[2] In his work Fee considers 80,000 the number of infected in Guatemala. We think it premature to present exact statistics, but we believe this will prove greatly exaggerated.

The larvae which penetrate the human organism seem to be somewhat retarded in their transformation into adult filarias, and to provoke eye troubles. We have come to this conclusion from a circumstance which we have been able to study of a young man, who for the first time passed a vacation of a month in the infected zone. He consulted us the day following his return, and we were able to locate a tumor and recognize disturbances on the part of the eye.

The investigators have not been able to find the embryos in the circulation. With this object in view, Dr. Robles examined the blood several times in 24 hours and the result was always negative. They have tried to establish the formula for leucocytosis of these patients. The result has been a marked eosinophilia, 60%. This is of importance, as it is only 40% in patients who are carriers of intestinal parasites, which are in the majority.

Up to the present time we have not been able to make an autopsy, as there have been no deaths among our patients. But if we are to be guided by what is known of other filarias, we must believe that the same thing takes place in "Onchocercosis." The tumors are developed and grow only in the cellular tissues, under the skin, in the location pointed out by us. In fact, the filarias best known, show a marked predilection for the superficial parts of the body, and consequently inhabit the subcutaneous cellular tissue, which may be owing to the fact that they need to be near the surrounding atmosphere in order to assure the conservation of the species.

It is evident that the filarias live very

far from the organ of vision; but this is the organ which we have constantly found affected, in the hundreds of patients which we have examined in this regard. Consequently we can only believe that the parasites exercise their action at a distance, by means of a substance which they secrete and which is carried by the circulation to the whole organism. This substance has, among others, the property of producing, sometimes, perfectly appreciable lesions of the eye, and at other times, disturbances which we cannot recognize as yet, with the means of investigation at our disposal at the present time, but which lessen considerably the sight of those affected by this clinical condition. Such a process is not rare in parasitology. To go no further, no one doubts today that it is the secretions of parasites which produce the symptoms, at a distance, in "uncinariasis." The same process governs the general disturbances made by the larger number of other intestinal worms.

The disturbances which the secretions of the *Filaria onchocerca sp.* develop at a distance, are shown in the human organism by two classes of symptoms. Some are inconstant and affect different parts of the body in the form of eruptions, which have some of the characteristics of the erysipelas produced by the streptococcus, for which reason it is generally called by the name of "Coast Erysipelas." Other symptoms are constant and appear in all patients. We consider them characteristic of "Onchocercosis," and that they affect in different ways the organ of vision. To such an extent does this intimate relation between tumors and ocular manifestations exist, that when we find ocular symptoms, just as surely there are tumors; and vice versa, if tumors first call our attention, on examination, we find the sight affected.

The description of manifestations as varied as they are different, is no easy matter if they are not simplified as much as possible. For this reason, we shall divide the manifestations of "Onchocercosis" into two large classes: Extraocular manifestations and ocular manifestations. We will begin with the first, and everything which we note below is a faithful relation of what we have been able to observe during our stay in the infested zones, and what we have found in many patients who are constantly coming from a distance to consult us, either to our service in the General Hospital, or to our private clinic.

EXTRAOCULAR MANIFESTATIONS.

What we shall call extraocular symptoms of "Onchocercosis" are principally

Fig. 6.—Extraocular form. Child suffering the so-called "Coast erysipelas."

manifestations of the skin of the face; which show themselves in the form of eruptions more or less acute, and have in many ways a certain resemblance to the erysipelas produced by the streptococcus, for which reason it has been called generally, as we have already said, "Coast Erysipelas."

Its resemblance to the true erysipelas is very marked, as to the short time in which it develops into an acute eruption. (Fig. 6.) In three days the face is swollen, the skin is tight, puffed up by a hard infiltration which eradicates the natural folds and the wrinkles of age, and is very different from edema, as the pressure of the finger leaves no impression. The eyelids, lips and ears partake of the infiltration; and being double their usual thickness, acquire the appearance which they have in erysipelatous infiltration of the face. But this condition differs from it, in that no change in the color of the skin is observed, nor local differ-

ences of temperature exist. The subjective sensations, which those attacked experience, are only photophobia, a sensation of a drawing of the skin of the face, as tho this distended skin was about to burst open; and local irritations and itchings.

When the acute eruption is passed (it sometimes reappears at irregular intervals), the manifestations become less; and this new state is what is called the chronic form. In reality it only differs from the acute by the diminishing of the symptoms; and by an olive or bronzed color, which the affected parts take on, and which seems to be peculiar to the disease. There is also observed in the height of the period of subsidence, a very fine scaling off of the skin, such as takes place in pyrexia; which gives the patient the appearance of having powdered the face.

The extraocular symptoms appear most frequently in the subjects whose infection is recent. They sometimes precede ocular symptoms, but they generally develop at the same time. They do not correspond particularly to any definite ocular form. In the course of an ocular form, erysipelas manifestations may be entirely lacking. In some they make their appearance for a short time, and in others for a long period.

It is absolutely unknown what the relation is which undoubtedly governs the appearing of the symptoms in the form of eruptions. We suppose, however, that they must have some relation to the life of the parasite. It is beyond all discussion that all the patients who present the complete symptoms of "Coast Erysipelas" have filarial tumors in some part of the body.

OCULAR MANIFESTATIONS.

Everything that we shall note below in regard to ocular symptoms, which is the principal object of this study, we take from our own observations, and in order to explain them as clearly as possible we shall group them in clinical forms, which appear, at first sight, to have to do only with the tissue of the eye which is more or less affected. But after examining a large number of patients, it has been observed that between one form and another there exists a certain real relation to ocular lesions; degrees more or less advanced of a slow and progressive course which, in the majority of those attacked, leads one to believe that it has a certain relation to the age of the infection.

In order to make a complete description of the ocular symptoms of Onchocercosis, we set forth the following scheme:

Keratitis Punctata Superficialis:
- Horizontal (Fig. 7.)
- Marginal (Fig. 8).
- Inferior (Fig. 9).

Iritis Fibrinosa:
- Without disturbance of the pupil (Fig. 7).
- With disturbance of the pupil (Fig. 9).

Amblyopia, without other appreciable symptoms.

But it must not be thought that we are speaking of pure forms, nor that only one tissue of the eye is affected. For example, when we say a person has the form of "Iritis Fibrinosa" without disturbance of the pupil, we do not mean the patient has the cornea entirely healthy, because this does not frequently happen. What it means is, that the part of the eye most affected is the iris,—that the symptoms on the part of the iris are those which predominate over the rest of the existing manifestations.

CLINICAL FORMS.

SUPERFICIAL HORIZONTAL PUNCTATE KERATITIS. This manifestation of Onchocercosis seems to be the one which presents itself most frequently, and seems also to be an early manifestation; it is observed, therefore, in the beginning of the disease and in young subjects. It sometimes accompanies the extraocular symptoms, but can develop perfectly without these symptoms appearing, or after they have disappeared.

The onchocercosis patient thus affected, begins by experiencing subjective sensations, as of a foreign object in the eye, dryness of the conjunctiva and pains around the orbit. These discomforts are accompanied by an intense photophobia (Fig. 10). The patient cannot endure the slightest brightness, for which reasons he

shuns the light, protecting himself by covering his eyes with his hands, or turning his back to the light, and only experiences relief in absolute darkness. In this condition, it is wholly impossible to make any examination of the eye; it is a useless undertaking to try to treat the eye with the orbicularis thus contracted to its maximum.

Not until the photophobia has somewhat subsided is it practicable to make a clinical examination, and it is then that

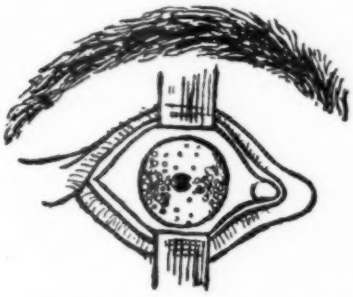


Fig. 7.—Superficial punctate keratitis. Horizontal form.

the patient begins to realize that he sees poorly. He sees objects surrounded by a dense mist, he only distinguishes masses.

The objective examination shows ciliary injection, which is very slight, exceedingly fine, and would pass unnoticed if not sought for. The membrane of Bowman is found to be infiltrated by very minute dots of a whitish color (Fig. 7), which do not stand out on the surface; and so slight that they would not be noticed if the cornea were not examined by oblique illumination, or the subject were not enlarged with a lens. The arrangement which this dotting takes is entirely characteristic of this form. It is observed that the lesions arrange themselves in the horizontal diameter of the cornea, precisely in the part which the eyelids leave uncovered when the eye is open. The grouping together of the lesions is denser near the edge, where it reaches its maximum; and diminishes progressively as it approaches the center of the cornea, where the elements are few in number and there are spaces entirely free from them. The centers are transparent. The pupil is contracted, free, but slow to act to the light and with atropin. The back part of the eye is normal.

We note that the arrangement in the direction of the horizontal diameter of this Superficial Keratitis Punctata is entirely its own, and characteristic of Onchocercosis. We know of no other affection of the cornea in which the elements, which constitute it, invariably keep this arrangement.

The course is rapid, and in a short time reaches the state of complete development. We have the observation of a male child of five months, which presented the complete clinical form. The mother said that the disease had made its appearance one month before. The lesions described have a chronic course, last for years. They diminish in time, but the dotted elements do not disappear entirely. Consequently, in all the cases in which the cornea has been affected, there remain indelible infiltrations which lessen the visual acuteness. Photophobia, which is the most troublesome symptom for the patients, disappears completely; and there seems to be no tendency to relapse.

Marginal Superficial Punctate Keratitis. We have also described this form under the name "Microcornea."[3] A short time ago we differentiated it from the other ocular manifestations. It presents itself somewhat frequently and has no acute period in its evolution. It develops independently from the extra-ocular symptoms.

Onchocercosal patients who have microcornea as the principal symptom or the only one, are not troubled with their sight. By this, we mean that their sight is normally acute, or very little changed. On account of its slow and insidious course, having no acute inflammatory symptoms which make them suffer, they do not consult a doctor. It is necessary to hunt them up; and, to a certain extent, compel them to be treated. These patients give the impression of having Microphthalmia (Fig. 8), which, however, is only in appearance, because the ocular globe is, in reality, of normal size.

It is the diameters of the transparent cornea which are found to be diminished; on an average they are reduced to 8 or 9

mm. The reduction in size is due to a process of marginal keratitis very different from the superficial horizontal keratitis punctata, which we have just described. In the marginal form, the elements are also superficial infiltrations, in the form of a slight dotting of Bowman's membrane, which are spread over the whole circumference of the border of the cornea. The grouping is so compact at this level, that it forms a uniform opaqueness of a whitish color, in the

Fig. 8.—Marginal superficial punctate keratitis.

form of a circle or ring, which has the same color as the scleral coat of the eyeball; so similar that it is confounded with it, all the more as there exists no appreciable line of demarcation between the two membranes. This concentric invasion of the cornea, which at some points reaches even as much as two mm., is what reduces the diameters and gives to the eye this special appearance.

If we compare the examination made in the dark room by oblique illumination with that of simple inspection without enlargement, it will be noticed that the opaqueness is superficial; and that it is situated in Bowman's membrane, from the level of which it does not stand out in relief. It is made up of slight dotted elements, disposed in groups so compact and uniform on the border of the external coat of the cornea, that it appears to be a continuation of the scleral coat of the eyeball, in the form of a thick and perfectly opaque membrane. But as it progresses in the direction of the center of the cornea, the infiltration becomes less, the elements become more scarce, until some are completely isolated. In the patients whom we have examined, the lesions do not advance to the center of the cornea. We have not found them in the part of the membrane thru which the luminous rays, which penetrate the eye, normally pass, and for this reason the visual acuteness is not diminished in this form.

The course is progressive and slow; but it appears to have a limit which it does not pass, since, as before stated, in

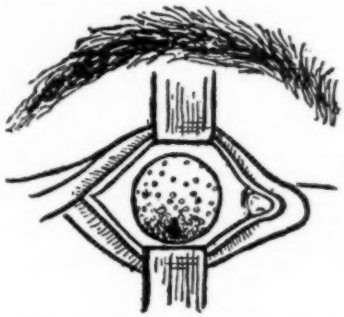


Fig. 9.—Late stage of chronic inferior superficial punctate keratitis with fibrinous iritis. Infiltrations chiefly in lower part of cornea. Pupil drawn down almost to lower limbus, an irregular vertical oval.

none of the cases presented to us have the lesions invaded the central part of the cornea, and consequently the vision has not suffered. We consider it therefore, the mildest form of Onchocercosis.

Inferior Superficial Punctate Keratitis (Fig. 9). This form is very characteristic of Onchocercosis. The keratitic infiltration is composed of superficial dotted elements, in every way similar to those described in the previous clinic forms, but they are very differently arranged. It has also, as a distinctive characteristic, that of not appearing alone. It accompanies the form Iritis Fibrinosa, with disturbance of the pupil and seems inseparable from it. For this reason we shall discuss it more in detail further on, describing together these two forms which belong wholly to Onchocercosis.

Fibrinous Iritis, Without Disturbance of the Pupil. This form is noticed in those onchocercosis patients whose infection is of long standing. It

is therefore slow in developing and insidious in establishing itself; and is generally found in those who have shown no extraocular symptoms. It is rarely seen pure, and generally appears to be a continuation of superficial punctate keratitis. Whether pure or mixed, the visual acuteness is very much affected.

The form is characterized by photophobia of moderate intensity. Persons thus affected are able to continue their occupations for a long time, to a certain extent. This they do best by protecting themselves from strong light,—drawing the brim of the hat down over their eyes, or using glasses of a suitable color. Besides, lacrimation and injection of the eyelids, persons thus affected cannot look at an object without tears immediately filling the eye, which, at the same time, becomes red and injected.

In a pure case, a very fine injection of the eyelid is noticed, which has the characteristic of only being very clear in the part of the eyeball which the opening of the eyelid leaves uncovered when the eye is used. The corneal centers are permeable to the light. The iris is smooth, as if stretched. The pupil pointed in form, irregular, free, but does not react either to the light or to convergence. Atropin dilates it very little; which is very curious, as at the beginning of the disease and for some time after, there exist no adhesions which impede it. In cases of long standing, things change. The pupil, thus reduced and resting on the anterior face of the crystalline lens, does not react, being fixed in that position. Patients who reach this final stage are blind, they can scarcely distinguish day from night, and need some one to lead them.

Before the synechiae are established, the lesions undergo a marked regression when the organism is freed from tumors; but the operation has no effect when the disease has reached a more advanced stage. In such advanced cases, in which there are extensive synechias and the sight is almost gone, Dr. Domingo Alvarez practiced very extensive operations on the iris; which were successful as to the operation, but without functional result. We had the opportunity of making a careful examination of several of these patients, who show wide openings cut in the iris. But notwithstanding that the pupils were perfectly permeable to the light and the fundus apparently sound, they did not experience the least change in visual acuteness. Such facts tend to demonstrate that there must exist changes in the deep membranes, or in the optic nerve, which do not show themselves; or which we are not able to appreciate with the aid of methods of examination at our disposal.

Fibrinous Keratitis, with Disturbance of the Pupil. We wish now to call your attention to an ocular form, perfectly characteristic of Onchocercosis. We believe it belongs to this disease, as we do not know of this clinical picture having been presented before in ophthalmology. It is one of the latest manifestations; is seen in persons of 40 years of age and upward, and its frequency increases with age. So that it tends to make us believe that it is the last stage of Onchocercosis, and that it takes a good many years for it to reach this form which we are considering.

We suppose that it begins with the characteristics of Iritis Fibrinosa, without disturbance of the pupil, and that it is a continuation of it. We suppose, with some foundation for our belief, that it has to do with the same process. The exudation is deposited between the iris and the lower part of the crystalline lens, a position which it takes from its own weight, when the person is in a vertical position, which is the usual one; and that when it organizes the fibrin suffers retraction and carries the pupil downward with it.

This form is produced by changes in the iris and cornea. It is the result of the simultaneous development of a fibrous condition of the iris and a slow, superficial, punctate inflammation of the cornea. Both processes, thus combined, correspond to a clinical form belonging perfectly to, and very characteristic of Onchocercosis.

The pupil, pointed in form, adhering and immovable, is outside of the situation it normally occupies (Fig. 9). We notice that it has suffered a downward deviation. It occupies a new position, near the lower edge of the iris. It approaches

so near to this limit that it finally reaches it. The iris, due to its great elasticity, resists this pulling and is drawn tight, forming the back of the anterior chamber. It assumes a smooth aspect, as if it were wasting away. On studying a large number of patients, one discovers pupils situated at different points of the space they must pass over before they reach the limit of abnormal displacement. They accomplish this passage without the least manifestation of an acute stage.

In the lower limit of the cornea, near the edge, is noticed, as the pupil approaches this limit of displacement, the simultaneous development of a superficial opacity. By a careful examination, it has been proved that this infiltration is composed of very fine elements, pointed in form, situated superficially in the membrane of Bowman; which, on account of the arrangement they maintain, being more abundant near the edge, appear to be an infiltration which invades the cornea from the circumference toward the center, but which diminishes and disappears entirely after having penetrated it only a short distance.

In certain patients, in which the displacement was complete, and the development of the infiltration of the cornea was thick, it was utterly impossible to record the condition of the pupil. It seems going too far for us to state that in these cases we had to do with blind or incurable persons. Incisions of the iris, which were performed, did not give them their sight. Undoubtedly this lack of improvement was due to inappreciable changes in the deep membranes of the eye or the optic nerve. These are developed simultaneously, as happens in the form which we described above.

Amblyopia, without Appreciable Symptoms. We put in this group onchocercosis patients who only suffer gradual diminution of visual acuteness, without experiencing any other phenomenon than the gradual loss of sight, so that during the whole course of its development not the least change in the ocular globe is noticed, even on minute examination.

We suspected, at first, that there were lesions in the back of the eye. In order to find out what these were, we performed repeated ophthalmoscopic examinations, and the result was always negative. We found no change to which we could attribute, even remotely, the diminution of the sight.

It is generally a disease affecting adults around 40 and over, and they are all carriers of onchocercosis tumors. They have noticed that for some time they did not see well, and that they continually see less, without experiencing anything else abnormal. After a good many years of this gradual loss of sight, they arrive at such a stage that they are unable to walk alone, in broad daylight; and are seen with head high in the air, eyelids very wide open, the eyes moving constantly without fixing objects, etc., etc.

The lack of ophthalmoscopic symptoms in this form of Onchocercosis proves clearly the following interesting observation: A lady in our best society was obliged to consult an optician, because she noticed that on certain days she saw very poorly. This optician, thru ignorance, had the mania of sending to the United States those patients whom he could not fit with suitable glasses. In consequence, the lady made a voyage to New Orleans, where she consulted a noted oculist who exhausted every means of investigation in the eight consecutive days that the examination lasted; and finally, he explained that it was an error of refraction, and ordered the use of graduated glasses. As the lady experienced no relief, she went to New York and in that great city put herself in the hands of the best known oculist, who, in his turn, gave the opinion that there existed no lesion in the back of the eye, and limited himself to giving her a formula for spectacles.

Both of these distinguished oculists made an ophthalmoscopic examination and both declared that there was not the least lesion of the deep membranes, nor of the optic nerve. On her return she consulted us. We found only a progressive diminution of visual acuteness, which was not due to any appreciable lesion of the apparatus of sight; and a small tumor of the size of a bean, which did not bother her in the least, and which had been growing for a long time, near the end of the left eyebrow. The extirpation of the tumor had for immediate

result an increase of visual acuteness, which has continued up to the present date.

In the form which we are considering, the visual acuteness increases considerably, immediately after all the tumors are removed. We have several observations which prove this; one, especially, illustrates the point. A patient from the infested zone arrives, led by a guide,—the examination is negative. Visual acuteness; he is only able to distinguish day from night. That same day, the tumors, which were on his head, were removed; and the following day he arrives for treatment already seeing perfectly, and to prove it, he points out the sea, 30 miles away.

There are not lacking those who would attribute much more to Onchocercosis. Without denying anything, we limit ourselves to what has been described. Until a larger number of observations have proved other things, we do not care to venture into the unknown. Possibly, many forms which some doctors like to multiply indefinitely, are isolated cases, which need ample and very minute study, in order to exclude other pathologic factors which can modify greatly.

A single example will illustrate better what I wish to maintain. It is the case of a boy of 11 years, who came from Patulul, having a great number of onchocercosal tumors in the head, and a typical interstitial inflammation of the cornea. The general examination, which we make of every patient, showed us the existence of an exostosis of the right tibia and Hutchinson teeth; which was sufficient for us to require a visit of the father, who told us the mother was syphilitic.

Without advising previous treatment, we removed the tumors. The result of the operation was: the rapid disappearance of the photophobia and excessive secretion of tears; but the infiltration of the cornea was not modified in the least. after waiting three weeks, we commenced a treatment of mercury and iodid; which resulted in a perceptible modification of the exostosis and the complete absorption of the interstitial infiltration of the cornea. Similar cases must exist, and for this reason all ocular manifestations must not be considered as dependent upon Onchocercosis, because of the fact that they coincide with it, in that there are onchocercosis tumors present in the organism.

On one point, however, we must insist once more, and that is: the fact that all ocular forms which we have described, pure or combined, we have observed in a great number of patients who had in their

Fig. 10.—Filarial tumor of scalp indicated by cross. Extreme photophobia shown by contraction of brow and partial closure of lids.

Fig. 11.—The same patient as Fig. 10, after removal of tumor, showing by relaxation of face his relief from photophobia.

bodies onchocercosis tumors, acquired in the infected zone; and that these forms have characteristic features which perfectly differentiate them from similar manifestations of different etiology.

The course of the ocular forms which we have described, is chronic and progressive. They take years to develop; they usually attack the anterior segment of the eye: the cornea and the iris; and the changes which they pass thru are apparent. The cornea is generally first to be attacked, and later, the iris; but as a matter of fact there are cases in which the order is reversed.

Likewise, in the clinic one runs across pure manifestations, in which we find only one of these membranes affected. In the forms of superficial punctate keratitis, in the beginning of fibrinous iritis without deviation of the pupil, and in amblyopia without appreciable lesions, the patients experience a great improvement, and a considerable increase in visual acuteness, immediately after the tumors are removed (Figs. 10 and 11). This does not happen in the advanced forms of fibrinous keratitis with and without displacement of the pupil, but this is owing to the fact that the synechias and displacement which the pupil undergoes are so constituted and undergo changes so great, that they are not modified. But these cases do cease to progress. The keratitis punctata seems to have a limit which it does not pass, and the arrangement of the lesions is confined to a certain order which is characteristic of the form which it represents.

The diagnosis is clinical. The laboratory aids very little, because in daily practice it is not a question of establishing the species to which the parasite belongs, which is a matter of long investigation. The clinic alone is sufficient to prove the presence of tumors, which are characteristic of the ocular and extraocular disturbances which we have described. When it is the ocular and extraocular manifestations which arrest the attention, we believe that they are in themselves sufficiently characteristic and different from other pathologic entities. So that one thinks immediately of Onchocercosis; and the presence of tumors serves to confirm the diagnosis, leaving no room for doubt. But it is not always possible to locate the tumors, and in this case the clinical description is, of itself, sufficiently typical, so that the disease would not be taken for an infection of a different nature.

Under these conditions we have followed carefully, for two years, a case of horizontal superficial punctate keratitis, of the purest type; which has not been benefitted in the least by many treatments, local and general, to which we have subjected it during this long period, because we have not been able to find the tumors which everything leads us to believe exist; and the cause remaining, the disturbances continue the same.

Embryos have not been found in the blood, altho investigations have been made, repeating the examinations several times in the 24 hours. The leucocythemia is of importance, because it has been established that the 60% eosinophiles represent a rather exaggerated eosinophilia, which would be difficult to find in any other parasitic disease.

In case there is the slightest doubt about the nature of the tumors, the cutting of one of them would show the presence of the parasite; which is seen rolled up like a ball of the size and color of a white thread. Squeezing one of the sections between the fingers, a liquid oozes out; which, on microscopic examination, shows innumerable embryos.

We believe Onchocercosis to be a disease of grave prognosis, as it affects the visual function. Because, if not treated properly, the sight is gravely impaired, and a late treatment is not always effective, as the disturbances are not modified, —the lesions have reached a stage from which they cannot go back.

In the presence of the ocular forms which we have described as produced by Onchocercosis, every treatment fails, which does not remove all the tumors which exist in the organism of the patient. We have tried, without success, all the usual remedies, making use of the various channels: stomachal, subcutaneous, intravenous, conjunctival, subconjunctival, and injecting into the tumor itself. The removal of the tumor, on the contrary, gives immediate and surprising

results; for incurable disturbances, it at least checks the progressive course of the lesions. We insist upon the fact that favorable results are wanting when all the tumors are not removed, which happens when they are very small and pass unnoticed.

The removal of the tumors is an operation of minor surgery, which is accomplished with a local anesthetic. The operation is very simple and presents no difficulties whatever, as the tumors are perfectly limited, and consequently isolated from the neighboring tissues, with which they have no adhesions which might be necessary to consider. As they are almost always found in the head, under the skin of the hair, our advice is, when there are several tumors, to make various incisions, one for each tumor; and not a large incision which takes them all in, as such an extensive wound bleeds too much and it is difficult to sew up so many blood vessels, which must necessarily be cut. And if the anesthesia is not good and the operation is too prolonged, the patient becomes restless and suffers,—all of which is spared by following this little precept of technic, the result of our own experience.

In the present state of our knowledge, it is not yet possible to formulate exact rules of prevention, because the agent is unknown which plays the important role of intermediary host. If our suspicions are taken into consideration, that the contagion takes place thru the intermediary of the taones or glosinas, which, as we know very well are blood-sucking insects which bite people during the daytime, live on the banks of streams, like the shady forests and shun exposed places, we would advise, as an efficacious preventive means, the following; which, from the point of view of the general conditions in the infected zone, are perfectly practicable.

1. The treatment by operation, of all persons having Onchocercosis.

2. The building of dwelling houses as far as possible from the banks of streams, in open places.

3. The introduction into dwelling houses, of potable water for domestic use.

4. The clearing of banks of streams which are near land which is cultivated.

LITERATURE.

1. Fee. California State Med. Jour., Sept., 1919.
2. Pacheco-Luna. Amer. Jour. Ophth. v. 1, 1918, p. 122.
3. Ibid. Arch. d'Opht. v. 35, p. 62.
4. Ibid. Arch. de Oft. Hisp.-Amer., v. 18, p. 107.
5. Ibid. Amer. Jour. Ophth. v. 2, p. 793.
6. Izquierdo. Amer. Jour. Ophth. v. 2, 1919, p. 274.

SPASM OF THE RETINAL ARTERIES.

WM. H. CRISP, M.D., D.OPH., F.A.C.S.,

DENVER, COLORADO.

This paper presents summaries of the most striking cases previously reported, and reports a new one occurring in a girl of 14 years, apparently in good general health. Altho the caliber of the vessels was subsequently restored, permanent impairment of the visual field remained. Read before the American Academy of Ophthalmology and Oto-Laryngology, Kansas City, October, 1920.

Obstruction to the arterial circulation is commonly due either to thrombosis or to embolism; that is to the gradual formation or lodgment of pathologic material in the lumen of the vessel. But it is probable that, in any part of the circulatory system in which end arteries occur, the blood supply may be temporarily cut off purely as the result of spasmodic contraction of the muscular fibers in the middle coat of the artery.

The important bearing of our direct observation of the retinal circulation upon a general understanding of vascular physiology and pathology is illustrated by the fact that arterial spasm was first accurately observed and understood when occurring in the fundus of the eye. Osler, discussing the occurrence of transient attacks of aphasia and paralysis in states of high blood pressure and arteriosclerosis, recognizes Peabody's priority in the rational explanation of this class of cases, as being due to the same anomalous contraction of the arterial wall as has been described in relation to the retina. A score or more of cerebral cases experienced by Osler had occurred partly in healthy individuals with high blood pressure but without signs of arterial disease, and partly in well marked or advanced cases of arteriosclerosis.

Two special disease complexes are mentioned by Osler as occasionally presenting symptoms attributable to intermittent closing of the cerebral vessels; namely Raynaud's disease, in a case of which he saw recurring attacks of aphasia, hemiplegia, and loss of consciousness, and angioneurotic edema, a case of which in Osler's experience, in a physician aged twenty-nine years, had developed right hemiplegia and aphasia at the age of nine years, then within a year five or six attacks of transient hemiplegia, and subsequently migraine and the well marked attacks of angioneurotic edema.

Langdon found that cases of spasmodic closure of the retinal arteries could be divided into the following two classes: (1) those in which the first attack occurred at or after middle life, and evidences of renal vascular disease were found; and (2) a few cases beginning in early life, between eight and twenty-five years, without any other symptoms of cardiovascular disease.

Nettleship, who reported two cases, mentions as the common characteristic of cases of arterial spasm the sudden occurrence of loss of vision which continues only a short time (from a few minutes up to one or two hours), affects only one eye, and usually disappears as quickly as it came. But he adds that in some cases a final attack, instead of passing over in the usual way, leads to complete blindness.

Unfortunately, in the majority of cases the arterial change is only visualized through its symptoms and does not present itself to direct observation. The most detailed ophthalmoscopic description of a case so observed is given by Harbridge. The attacks recurred for ten days, one day as often as every forty minutes. The first attack came while bending over, and subsequent attacks followed movements requiring a bending position.

At the beginning of an attack there was gradual diminution in caliber of the inferior temporal artery, and this was rapidly followed by the same change in the other retinal arteries, until they were completely collapsed. Shortly after the arterial change, the veins underwent a similar process. The nerve head became pallid, the retina somewhat hazy. The retinal vessels looked like ribbons against the fundus. This condition continued about four minutes. Then the inferior arteries began to fill, quickly followed by the others; and lastly the blood stream

was reestablished in the veins, the inferior one becoming enormously distended. Sight followed immediately after the filling of the vessels, altho the pupil was still dilated.

The patient, a man aged forty-nine years, had suffered five years previously from attacks of vertigo that had recurred over a year. There was slight sclerosis of the vessels, and there were signs suggestive of beginning tabes. The attacks of temporary blindness finally ceased after thoro purging.

Another patient observed by Harbridge, and who subsequently died of uremia, for five or six years occasionally experienced in the right eye misty vision on unusual exertion. The sight of this eye was then rapidly lost, and frequent study of the fundus after this event showed a peculiar cycle of changes in the retinal blood current. The complete cycle, which lasted about ten minutes, began with an interruption of the blood current in the arteries just after they left the disc. This interruption gradually passed towards the periphery of the fundus while a similar process in the veins passed from the periphery toward the disc. The empty blood vessels appeared as white hollow tubes of normal width. This patient was apparently free from general arteriosclerosis.

Harbridge believes that the phenomena observed in his cases may be accounted for by assuming that primarily they are dependent upon one of the various types of arteriosclerosis. In the first of his cases here mentioned he assumes that a granulomatous nodosity of the intima was intruded into the lumen of the vessel during reflex contraction of the vessel wall. In the other case, which occurred in a person aged only thirty-one years, he postulates a fibrosis of the intima leading to an obliterative endarteritis, the primary cause being some form of infection. A man of fifty-two years who for some time had been under observation by Stölting on account of transient obscurations of vision developed such an attack while waiting in the doctor's office. The lower temporal artery appeared as a completely empty white chord, which however at once filled up again. The patient was an alcoholic, and suffered from mitral stenosis and insufficiency. He subsequently developed in his other eye an embolic process which resulted in a large permanent scotoma.

In a case reported by Lundie, in a man aged eighty-eight years, there was a single attack, lasting less than an hour. The upper division of the retinal artery showed an interruption of the blood column for a distance of less than one disc diameter, as tho the artery were being nipped as one nips an India rubber tube. As the attack passed off a fine thread of blood appeared in the portion of the artery previously empty, which soon regained its normal caliber.

Van de Graaf's patient was a woman of thirty-six years who had a hematoma of the frontal region. Shortly before convulsive seizures which were due to the pressure of the hematoma, the retinal arteries became extremely narrow; and shortly after the attacks the vessels were seen to become gradually refilled.

In Jamieson's patient, a man aged eighty-four years, the spasm apparently involved the central artery of the retina, which faded into a mere white line, this being followed closely by fading of the vein and its branches. The optic disc became white and the retina pale. The central artery became visible again in about two minutes time.

Loss of the upper nasal quadrant of the field of vision of the right eye in Hoppe's case occurred following fright during advanced pregnancy. The lower temporal artery on the disc and for a distance of one-fourth of a disc diameter beyond its margin appeared to be absolutely empty. During a period of observation of one and half hours, the blood column was seen at times to retreat from the disc and then return toward it. On the sixth day the previously narrowed portion of the vessel had become of nearly full width, and vision had improved. Hoppe is disposed to explain the disturbance as due to collapse of the vessel wall from temporary lowering of the blood pressure to a point where the pressure could be overcome by the intraocular tension.

A sailor aged thirty-two years whose case was reported by Benson experienced for four years occasional transient

obscurations of vision, sometimes affecting the whole of the field of vision, but most often only one section of the field. The frequency of these attacks increased from one a month or so to as many as two a day. During one of these attacks, Benson found the largest division of the inferior temporal artery of the retina entirely bloodless for about four disc diameters of its length. After a few seconds the interruption of the blood column moved toward the periphery of the fundus, disappearing as it reached the next large bifurcation. In this attack there was total obscuration of the field of vision, and Benson remarks that probably what he saw of it was its final stage only. But on two or three further occasions on which Benson and others were able to observe the fundus during these attacks, the emptying was seen again in the inferior temporal artery. It is interesting to note that on one occasion the patient inhaled the contents of a nitrite of amyl capsule just as he felt the obscuration coming on, but as far as he could judge this produced no effect in lessening the severity of the attack or the time that it lasted. Thoro and repeated examination of the patient by a general physician failed to discover any cardiac, renal, or other disease.

NEW CASE

The case which I had the good fortune to observe differs I believe from any previously reported. It belongs to the less common class in which the patient is young and apparently free from any arteriosclerotic disease. My patient was a vigorous and healthy girl of fourteen years. In the evening of July 5, 1920, she returned by automobile over a long stretch of mountain roads, a considerable part of which were steep, winding and rocky. She had had a large personal experience in driving, but on this occasion sat in the front seat of the car beside the driver. She told me that in such circumstances she thought she did more driving than if she had been actually at the steering wheel. At 10:00 p. m., not long after reaching home, she suddenly noticed loss of vision in the lower half of the right visual field. She thought she had noticed something like the same condition before, when taking music lessons that she did not like, but these previous attacks were apparently only the usual scotoma scintillans and always stopped when she left the teacher's house to go home. In the present attack there were no wavy lines. She came to my office at 11:40 a. m. on July 6, and stated that the defect in the visual field was no better than when it had begun the night before.

On account of lack of time, I made a rough estimate of the field of vision with my finger as a test object. I found that broadly the lower nasal part of the field was blind, the scotoma being incomplete for a short distance from the fixation point, and absolute over approximately the remainder of the quadrant. Examination of the fundus showed an interruption of the blood current in the principal branch of the upper temporal artery for a distance of about one-third of a disc diameter, beginning a little beyond the margin of the optic disc. The empty part of the vessel appeared as a white band of the same width as the rest of the vessel, and cut off from the normal portions of the artery at an abrupt transverse straight line at either end. (Fig. 1.) I did not observe, and do not believe that there existed, any difference in color between the blood stream beyond the interruption and that of the normal artery.

The patient was seen again three times in the course of the next two days. My history of the subsequent development of the condition is unfortunately not so detailed as could be wished, for the patient was difficult to keep in touch with. She paid relatively little attention to the eye disturbance, did a lot of automobiling with young friends while in town, and after a few days went out of the city, so that I did not see the eye for two weeks. A systematic field chart taken on July 8 was broadly in agreement with the first rough measurement. The interruption in the blood stream showed no change during the three days in which she was under steady observation, and after rather more than two weeks was only partially restored, the vessel at this time appearing as two blood columns of normal width connected by a much narrower red strip. This appearance lasted until

the latter part of July. During August and most of September I saw nothing of the eye. The field was again charted on September 22, and its appearance at that time is illustrated. (Fig. 2.) There was a broad area of complete blindness covering about the outer twenty degrees of the normal lower nasal field. Internal to this was an irregular strip covering from fifteen to thirty degrees, in which the test object was seen indistinctly. This indistinct area, and an irregularly oval-shaped complete scotoma which was included within it on the vertical line at from fifteen to twenty-five degrees below the fixation point, extended over into the lower temporal quadrant for about ten degrees. There was another small absolute scotoma within the indistinct area, along the two hundred and ten degree

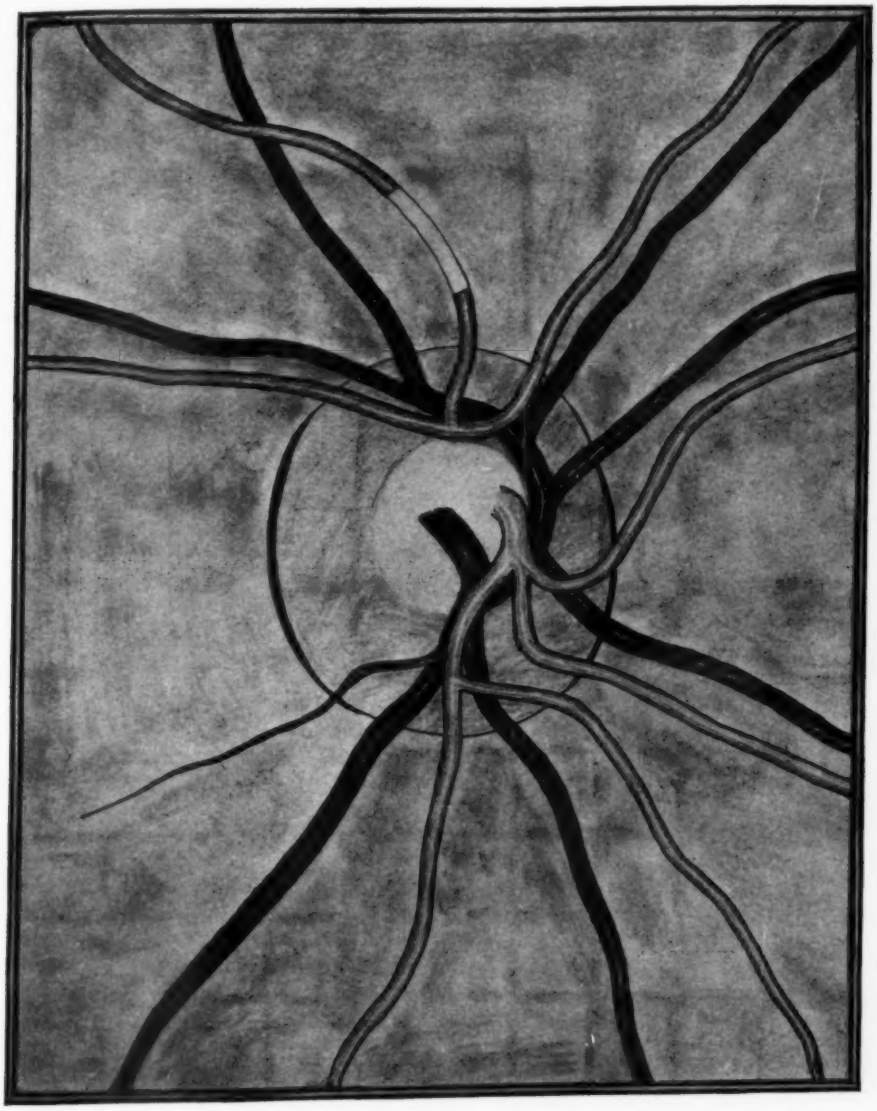


Fig. 1. Spasm of the retinal arteries. Drawing of the fundus in Crisp's case, showing interruption of blood column in upper temporal artery.

meridian, at between twenty-five and thirty degrees from the fixation point. A marked natural restlessness on the part of the patient during any form of examination made exact accuracy in detail difficult.

Central vision of the affected eye has at all times been absolutely normal. The patient's blood pressure, taken on several occasions, measured in the neighborhood of one hundred and ten millimeters of mercury. Her family physician, Dr. John Inglis, reported the cardiac and renal condition as entirely normal.

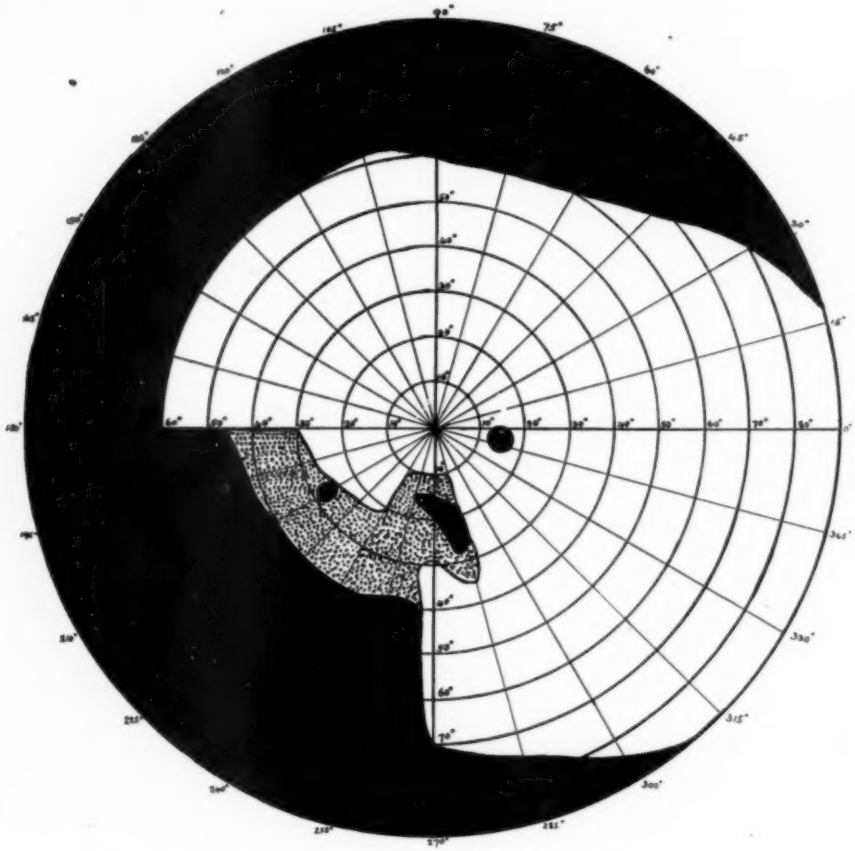


Fig. 2. Spasm of retinal arteries. Visual field in Crisp's case eleven weeks after onset.

COMMENT: The study of these cases of spasm of the arteries is an extremely interesting one, and, as with a good many other eye conditions, tantalizing in the obscurity of its anatomic foundation. The only plausible explanation which has been advanced is that of a spasmodic contraction of the muscular coat of the vessel. Spasm is presumably due, as in the case of the ciliary muscle and accommodation, to either excessive irritation or excessive irritability or both. In my patient the retina was undoubtedly subjected to an excessive amount of irritation. Excessive irritability was present in the highstrung nervous system of the patient. In prolonged and intense ocular fixation, especially of rapidly moving objects, the winking reflex is to some extent inhibited, so that the retina is in part deprived of its normal opportunity for rest.

Increased use is followed by increased circulation of the blood in the part. The mechanism of increased blood supply includes on the one hand dilatation of the blood vessels, and on the other hand an

increase in what may be called the peristaltic movement of the vessel walls. Every small bundle of unstriped muscle fibers in the artery no doubt receives its impulse to contraction from a special nerve ending or group of nerve endings. It is conceivable that excessive innervation, a sort of local flooding with nerve force, of a particular stretch of muscle in the middle coat of the artery might result in persistent contraction without the subsequent relaxation which normally should occur. To inquire why that particular stretch of muscle fibers should be selected for overstimulation is perhaps as futile as to wonder why lightning may kill a horse and spare its rider.

Another question to which I can offer no answer is as to why, if the empty strip of bloodvessel which I observed was caused by a spasm of the muscular coat of the vessel, did the empty part of the artery appear of normal width. Furthermore, if the color of the retinal arteries is due to the viewing of the blood thru a transparent arterial wall, why did the empty bloodvessel appear white instead of transmitting the normal diffuse ruddy tint of the eyeground?

I believe it is fair to suppose that not only this case of arterial spasm but many other accidents to the retinal circulation may be excited by excessive strain upon the retinal and accommodative functions, with the resulting hyperemia and vasomotor overstimulation; especially when we consider that these excesses are often merely part of a general agitation of the central nervous system.

SIGNIFICANCE OF SYPHILIS AS AN ETIOLOGIC FACTOR IN ACUTE IRITIS.

C. A. CLAPP, M.D.

BALTIMORE, MARYLAND.

This paper reports in tabular form 100 cases of acute iritis in 80 per cent of which syphilis was found to be the etiologic factor. The methods of diagnosis relied upon were the Wassermann reaction, the presence of condylomata, and the therapeutic test.

On June 10, 1916, there appeared in the Journal of the American Medical Association an article by Irons and Brown, in which they had made a critical survey of 100 cases of acute nontraumatic iritis, forty-seven being private and fifty-three clinic cases. In this series they found syphilis as an etiologic factor present in only 23%. A report on 500 cases from the Wills' Eye Hospital by Jennings and Hill (OPHTHALMOLOGY, April, 1909) gave 61.4 as the percentage due to syphilis.

In order to determine in my own mind which of these figures should receive greater credence, I have tabulated the last 87 cases that occurred in our clinic in one group, and in the other 13 cases that occurred in private practice.

Of the first group, 43 had a positive Wassermann, which cleared up under specific treatment, or 49.4%; and 20, or 33.3%, were diagnosed specific clinically, and were relieved by this line of treatment. If the cases in this group were correctly diagnosed, and certainly those showing condylomata of the iris were correct, this makes a percentage of 82.4 in which the spirochetae were the chief etiologic factor. Thirteen, or 15.6%, were negative by the Wassermann test, altho two of these were diagnosed specific from history and therapeutic test, one was doubtful, and one not taken, but diagnosed nonspecific clinically, making a total of 17.1% that seemed nonspecific in origin, most of which came under the head of focal infections, with the teeth as chief offenders. One case was tubercular in origin.

In the group of 13 cases seen in private practice, 9 were certainly specific, or 69%; while one was a diabetic, and the others the result of focal infections, with the teeth again a chief offender. While those met in office work showed a lessened percentage of syphilitic origin, this was probably due in a large measure to racial difference, but social status was undoubtedly a factor.

In making the diagnosis of a syphilitic iritis there are three very important points to be considered.

1st. The Wassermann Reaction.
2nd. The Presence of Condylomata.
3rd. The Therapeutic Diagnosis.

(1) While some do not consider a case of acute iritis with a positive Wassermann to be always of specific origin, I am of the opposite opinion; and while I can imagine such a condition, it is so rare that the exception proves the rule, and I am very certain that I have never seen a case that did not clear up under antiluetic treatment with the possible exception of a case complicated by tuberculosis.

So that where we have found a positive blood reaction (and usually it is triple positive), we have considered such cases to be luetic.

(2) A condyloma of the iris is, in my opinion, such a positive clinical evidence that I am more inclined to accept it as a positive sign than even a Wassermann reaction. While there is the possibility of mistaking the miliary tubercle for a condyloma, the clinical appearances are dissimilar, and the mistake must necessarily be rare.

(3) Therapeutic Test. This method of diagnosis is the most open to question and yet in certain cases the only method available.

Take a case of acute iritis which, upon careful survey, shows no evidence of focal infection, with negative blood test and negative history, but with increasing pain and redness, and fibrinoplastic exudate into the anterior chamber, and then put upon energetic antiluetic treatment with marked cessation of the symptoms to complete recovery. Certainly this, to my mind, is just as posi-

tive a diagnosis as some of the laboratory tests.

It is true that many cases of acute iritis will be relieved by putting the iris at rest with atropin, and any treatment might be given the credit for the cure. But these cases were intentionally left out of this series as being too questionable for scientific purposes.

Many consider the history in these cases as important as the preceding factors, but I attach very little value to it. In the colored race, a negative history is the rule, even if there has been a very definite infection. Those cases that give a positive history usually give a history of some treatment, but it is possible for them to be cured of the luetic infection and still have iritis of various origins.

It may be that my friends in other sections of the country, after viewing these figures, will think that the vice crusade has not been especially successful here. It is true that the colored clientele at our clinic is undoubtedly a factor in the high percentage.

CONCLUSIONS: (1) According to this investigation, syphilis is the etiologic factor in about 80% of acute iritis cases.

(2) About two-thirds of the cases are male.

(3) Eight per cent of the cases show condylomata of the iris.

(4) The average age is about 33 years.

HOSPITAL AND DISPENSARY PATIENTS

No.	Initials	Race	Age	Sex	Condition	Blood Wassermann	Remarks
1	R. M.	C	50	M	Acute Iritis.	+++	Secondary eruption and condyloma of iris.
2	J. W.	W	33	M	Acute Iritis.	++	
3	E. A.	C	26	M	Acute Iritis and Keratitis.	+++	Cleared up under treatment.
4	A. J.	C	43	M	Acute Iritis.	+++	
5	S. M.	C	49	M	Acute Iritis.	+++	Cleared up under specific treatment.
6	H. M.	C	24	M	Acute Iritis.	+++	Cured with mercury.
7	W. P.	W	12	M	Acute Iritis and Retinitis.		Acquired. Cured with mercury.
8	A. R.	C	23	F	Iritis and Uveitis	+	Cured with 606.
9	E. C.	C	27	M	Iritis and Keratitis.	++	
10	F. C.	C	36	M	Keratoiritis.	+	
11	A. F.	C	36	F	Iritis.	+	
12	J. H.	C	38	M	Keratoiritis.	+++	
13	E. P.	W	31	F	Iritis and Retinitis.	+++	Cleared up under specific treatment.
14	T. G.	W	42	F	Acute Iritis.	+++	
15	B. G.	C	26	F	Iritis and Neuritis	+++	
16	M. L.	C	42	M	Iritis	+++	Condyloma of Iris.
17	A. J.	W	17	F	Keratoiritis.	+++	
18	F. V.	C	24	M	Acute Iritis.	+++	
19	C. R.	C	30	M	Acute Iritis.	+++	
20	B. O.	C	54	F	Acute Iritis.	+++	
21	A. B.	C	55	F	Acute Iritis.	Not Taken	Diag. from condyloma and clearing up under treatment.
22	R. T.	C	27	M	Acute Iritis.	Spoiled.	Had initial lesion 1 year ago.
23	L. F.	C	34	M	Acute Iritis.	Spoiled.	Had initial lesion 1 year ago.
24	H. M.	W	30	M	Acute Iritis.	Neg.	Had initial lesion 2 years ago.
25	E. C.	C	40	M	Keratoiritis.	Neg.	Cleared up under 606.
26	I. G.	C	49	F	Acute Iritis.	Neg.	Cleared up under mercury.
27	H. M.	W	29	F	Acute Iritis.	Not Done.	Had clinical evidences of syphilis.
28	W. H.	C	36	M	Acute Iritis.	+++	
29	S. B.	W	45	M	Acute Iritis.	+++	
30	R. R.	C	40	F	Acute Iritis.	+++	Improved rapidly under mercury.
31	M. G.	C	17	F	Acute Iritis.	+++	
32	E. G.	C	28	M	Acute Iritis.	+++	
33	L. B.	C	43	F	Cyclitis and Iritis.	+++	Condyloma of iris.
34	A. B.	C	53	F	Acute Iritis.	+++	
35	H. M.	C	44	M	Acute Iritis.	+++	
36	L. Z.	W	22	M	Acute Iritis.	+++	
37	M. M.	C	27	F	Acute Iritis.	+++	
38	M. S.	C	38	M	Acute Iritis.	+++	
39	H. B.	C	19	M	Acute Iritis.	Not Taken	Condyloma of iris.
40	E. A.	C	26	M	Acute Iritis.	+++	Genital lesion 3 years ago.
41	S. M.	C	49	F	Acute Iritis.	+++	Cured by antiluetic treatment.
42	C. M.	W	48	..	Acute Iritis.	+++	Primary lesion 15 years ago.
43	E. P.	W	31	F	Acute Iritis.	+++	Papular syphilide.
44	H. M.	W	30	M	Acute Iritis.	Neg.	Initial lesion 2 years ago. Cured by antiluetic treatment.
45	J. M.	C	43	F	Acute Iritis.	Not Taken	Had condyloma of iris.
46	E. C.	W	51	F	Acute Iritis.	+	Cured by Hg.
47	J. T.	..	..	M	Acute Iritis.	+++	Secondary eruption.
48	R. P.	C	27	M	Acute Iritis.	Not Taken	Genital lesion 2 years ago.
49	A. R.	C	23	F	Acute Iritis.	+++	Some keratitis.

50	A. F.	C	36	F	Acute Iritis.	+++	
51	W. P.	W	12	M	Acute Iritis.	+++	Acquired.
52	L. F.	C	34	M	Acute Iritis.	Spoiled.	Genital lesion 1 year ago.
53	J. W.	W	33	M	Acute Iritis.	++	
54	R. M.	C	50	M	Acute Iritis.	+++	Condyloma.
55	A. J.	C	43	M	Acute Iritis.	+++	
56	B. R.	C	28	M	Acute Iritis.	Neg.	Genital lesion 6 years ago.
57	G. P.	C	30	F	Acute Iritis.	Not Taken	Diag. clinically as specific.
58	J. H.	C	34	M	Acute Iritis.	Not Taken	Gave history of initial lesion.
59	B. F.	C	26	M	Keratoiritis.	Not Taken	Diagnosed clinically as specific.
60	J. B.	C	28	M	Acute Iritis.	Not Taken	History of initial lesion.
61	P. R.	C	22	M	Acute Iritis.	Not Taken	Cured with mercury and gave history of lesion.
62	A. M.	C	38	M	Acute Iritis.	Not Taken	Diagnosed as specific.
63	T. R.	C	26	M	Acute Iritis.	Not Taken	History of initial lesion.
64	R. S.	C	22	M	Acute Iritis.	Not Taken	History of initial lesion.
65	M. S.	C	23	F	Keratoiritis.	Not Taken	Cured by mercury.
66	M. H. ...	C	14	F	Acute Iritis.	Not Taken	Condyloma of iris.
67	G. S.	C	30	M	Acute Iritis.	Not Taken	Diagnosed as specific.
68	R. P.	C	21	M	Acute Iritis.	Not Taken	Diagnosed as specific.
69	J. F.	W	48	M	Acute Iritis.	Not Taken	Diagnosed as specific.
70	E. W.	C	24	M	Acute Iritis.	Not Taken	Cured by use of mercury.
71	H. B.	C	33	M	Acute Iritis.	Not Taken	Diagnosed as specific.
72	C. A.	C	20	M	Acute Iritis.	Not Taken	No definite etiology found.
73	J. W.	C	24	M	Acute Iritis.	Neg.	No definite etiology found.
74	M. W. ...	C	30	F	Acute Iritis.	Neg.	No definite etiology found.
75	M. T.	C	17	F	Acute Iritis.	Neg.	Improved under mercury.
76	J. K.	C	27	M	Acute Iritis.	Neg.	Diag. of rheumatic iritis (?).
77	G. G.	W	35	M	Acute Iritis.	Neg.	Nondiagnosis as to etiology.
78	O. L.	C	27	M	Acute Iritis.	Neg.	
79	M. F.	C	26	F	Acute Iritis.	Neg.	
80	E. C.	C	45	F	Acute Iritis.	Neg.	
81	H. P.	C	?	F	Acute Iritis.	Neg.	Had what he called rheumatism.
82	G. W. ...	C	49	M	Acute Iritis.	Neg.	
83	C. J.	W	12	M	Acute Iritis.	Neg.	Tubercular.
84	I. C.	C	26	F	Keratoiritis.	Neg.	
85	F. E.	C	54	M	Acute Iritis.	Doubtful.	
86	J. J.	C	?	F	Acute Iritis.	Not Taken	Had rheumatoid arthritis.
87	R. B.	C	30	M	Acute Iritis.	Not Taken	Diagnosed as specific.

PRIVATE PRACTICE

88	R. D.	W	?	F	Acute Iritis.	Not Done.	Spec. Had mucous patches.
89	J. S.	W	36	M	Acute Iritis.	Not Done.	Diag. rheumatic.
90	M. S.	W	54	F	Acute Iritis.	Not Done.	Diabetic.
91	P. O. D...	W	22	M	Acute Iritis.	Neg.	Diag. focal inf. front tooth.
92	W. P.	W	25	M	Acute Iritis.	Neg.	Spec. Altho negative Wassermann he was put on Hg. and iritis cleared up. All other tests negative.
93	C. N.	W	38	M	Iritis and Neuritis.	+++	
94	J. M.	W	?	M	Acute Iritis.	Not Done.	Diag. specific.
95	J. L.	W	59	M	Acute Plastic.	Not Done.	Had initial lesion 4 mos. earlier.
96	V. G.	C	27	M	Acute Iritis.	+++	
97	M. S.	W	55	M	Acute Iritis.	Neg.	No focal infection found.
98	W. J. T...	W	21	M	Acute Iritis.	+++	Cured with Hg.
99	C. B.	W	53	M	Acute Iritis.	+++	Cleared up under 606.
100	J. F.	W	35	M	Acute Iritis.	+	Treated by 606 and Hg., cured.

DISORDERS OF LACRIMAL DRAINAGE.

H. D. Lamb, M.D.

ST. LOUIS, MO.

This paper gives a general review of these disorders and of the methods of treatment commonly resorted to for them. It was read before the St. Louis Ophthalmic Conference, May 14, 1920; introducing a discussion, which is reported on page 207.

It is interesting to find mention of disorders of lacrimal drainage, with methods of treatment, in the medical writings of antiquity. The Papyrus Ebers, relating to Egyptian ocular therapeutics of 1500 B.C., states that "for the driving away of a swelling on the nose" (undoubtedly dacryocystitis is meant) "use antimony, powdered wood, myrrh and dried honey—rubbing it into the eyes for four days."

Surgical procedures in these cases were practised early, for we find recommendation for excision of the lacrimal sac in cases of fistula made in the writings of Celsus, a Greco-Roman physician of the first century. With a clamp the margin of the opening was seized and the entire abscess cavity was separated and excised down to the bone. The bone was then cauterized with the red-hot iron. Some physicians, Celsus tells us, applied only caustic applications such as copperas or grated verdigris.

Toti can hardly claim priority for the tear-sac operation that bears his name, for Galen writes in the second century that Archigenes in cases of fistula lacrimalis, perforated the nasal bone with a small drill: also Paul in the seventh century says, "After excision of the flesh, use a perforator and make a passage for the fluid or matter to the nose."

Compression of the tear-sac by instruments, the injection of medicinal preparations and the dilatation of the nasal duct by means of sounds were first recommended by the Arabian physicians Rhazes and Avicenna in the 10th and 11th centuries.

Geerig, in his work entitled "Armamentarium Chirurgicum" published in 1838, describes fourteen different instruments, proposed by as many surgeons, for making a passage from the tear-sac thru the lacrimal bone into the nose.

A brief review of some points in the anatomy and physiology of the lacrimal drainage apparatus will I hope not be too tiresome.

The canaliculi are surrounded by a dense network of elastic and muscle fibers; the muscle fibers are arranged circularly about the vertical portion of each canaliculus, but run parallel to the horizontal portion. The openings of the canaliculi into the sac lie behind the middle of the internal palpebral ligament. The lacrimal sac itself contains in its submucosa a large number of elastic fibers.

The tears get into the canaliculi and the tear-sac partly thru capillary action, but largely thru the act of winking. With every contraction of the orbicularis muscle the outer wall of the tear-sac is pulled outwards and forwards, because this wall of the sac is adherent to the internal palpebral ligament and from this ligament originate the fibers of the central or palpebral portion of the orbicularis muscle. The inner wall of the tear-sac being firmly fixed to the bony lacrimal fossa cannot follow the anterior wall as it is pulled forwards and outwards and a lumen is formed, whereas before the sac walls lay in apposition. Into this new formed cavity the tears are sucked thru the action of the vacuum formed. As the orbicularis relaxes the stretched elastic fibers of the tear-sac contract and force the tears into the lacrimal duct, which is wider than the canaliculi. Regurgitation is prevented by the contraction of the muscular and elastic fibers of the latter.

The lacrimal duct has a length of about 15 to 20 mm. and a diameter between bony walls of from 3 to 8 mm. The direction of the lacrimal duct is downward and backwards and most commonly outwards. The deviation backwards is about the same as a line

from the lacrimal sac to the second molar tooth.

The mucous membrane of the lacrimal sac and that of the lacrimal duct form one continuous whole. In both, the epithelium is of two or more layers of cylinder cells; on the inner or highest layer of the duct some observers have made out cilia. The submucous tissue of the lacrimal duct contains a dense plexus of wide veins, analogous to the venous plexuses beneath the mucous membrane of the turbinated bodies. The lumen of the duct in life is reduced to the size of a capillary slit as is that of the sac.

The narrowest part of the duct is at its upper end, where there is commonly left, as a fetal relic, a protruding thickening on the lateral wall of the duct. There is another narrow portion at about the middle of its length; and altho the duct is somewhat expanded where it enters the nose, yet the outlet itself is usually rather constricted. This latter condition is due to a fold of mucous membrane sometimes called the Valve of Hasner, which, extending obliquely from the surrounding margin of the bony orifice of the lacrimal duct, covers over the outlet of the duct, in varying degree.

The walls of the naso-lacrimal duct in the adult are not always smooth and regular, like a more or less uniform cylinder, but at times show folding of the mucous membrane and the formation of diverticula, as established by Tartuferi and confirmed by Hansell. The presence of these irregularities is readily explained by the fact that in the newborn the inner wall of the passage shows many different varieties of protrusions, contractions and other irregularities; whereas, during the period of growth, these usually disappear; at times they may persist to a greater or less degree.

According to Aubaret the anterior ethmoidal cells may extend forwards so as to be in close contact posteriorly, mesially and even anteriorly, with the upper part of the nasal duct.

Whitnall has shown that in 100 skulls examined, approximately the inferior half of the lacrimal sac fossa was found in every case in relation with the anterior part of the middle nasal fossa, which could easily be entered thru the thin posterior portion of this area formed by the lacrimal bone; also that the superior half of the lacrimal fossa presented relations to an anterior ethmoidal cell.

The pathologic changes of the lacrimal drainage apparatus and their treatment are too familiar to be described in detail.

Drainage of the tears can be disturbed:

1.) By the tears being unable to get into the canaliculi readily.

a.) Very rarely is there present a closure of the entrance of the canaliculi thru congenital atresia, blocking by scar tissue after injury or thru inflammation of the wall of the canaliculus as from trachoma.

b.) A very common change interfering with the entrance of the tears into the canaliculi, especially of the lower one, is eversion of the eyelid.

2.) By blocking within the tear-draining passages.

A.) Within the canaliculi (stenosis or obliteration).

(a) From trachoma and other inflammatory conditions.

(b) From penetrating injuries and caustic burns.

(c) By foreign material, e. g., a cilium, a piece of the beard of barley or wheat; and, rarely by the so-called "concretions," which are yellow, crumbly, actinomyces like granules composed of compact masses of the fungus streptothrix.

The treatment of all these disorders of the puncta and canaliculi is briefly —slitting the canaliculi.

(B.) Blocking within the tear-sac and within the nasal duct must be considered together since these two structures are essentially parts of one membranous tube.

1.) Obstruction of the Nasal Duct can be caused by:

(a) An acute swelling of the mucous membrane of the duct, or only of the nasal mucous membrane surrounding the outlet of the duct into the nose.

(b) A chronic inflammatory process, or

(c) A cicatricial or at times an osseous obstruction.

2.) Causes of strictures and stenoses of the nasal canal:

(a) Congenitally, there is at times a membranous closure of the outlet of the duct.

(b) As acquired conditions, strictures in the nasal duct are usually the result of inflammations developed in the mucous membrane or submucosa of this passage, little erosions, ulcerations or abscesses from nasal catarrh, or from disease of the nasal sinuses.

(c) In both children and adults there may be a tubercular process of the nasal duct or the lacrimal sac.

(d) Syphilis also, in children and adults, may cause inflammation and scar formation in the nasal duct.

EFFECTS OF STRICTURE OR OBLITERATIONS OF THE NASAL DUCT.

In every case of closure of the duct the fluid in the sac is decomposed by the microorganisms present there (particularly pneumococci, more rarely influenza bacilli, Friedlander's pneumobacilli or streptococci), and there occurs usually a mucous or mucopurulent catarrh—a catarrhal dacryocystitis.

When the retention in the sac is long continued its walls expand and we have an ectasia of the tear-sac. Sometimes, thru expansion, the sac-wall becomes inelastic and such an ectasia then remains after the nasal-duct has been made patent again.

If the infected fluid in the sac causes a loss of continuity of the sac epithelium then microorganisms may get into the deeper tissues and lead to a phlegmon of the surrounding structures—a dacryocystitis phlegmonosa. The pus usually breaks thru externally and a fistula of the tear-sac is formed. When such a fistula is lined with epithelium, as soon occurs, spontaneous healing is no longer possible.

Repeated attacks of tear-sac inflammation occurring frequently can lead to shrinking and even obliteration of the sac.

After the lacrimal sac has become ectatic, the canaliculi as well as the nasal duct often become obliterated and there results a cyst. The contents of such a cystic sac may be entirely sterile.

TREATMENT OF DACRYOCYSTITIS.

Conservative Therapy:

1. Dilatation of the stricture by sounds, sometimes after a preceding incision of the stricture.

2. Formation of a new duct by forcible and repeated sounding.

3. Insertion of a style of lead, silver or gold, or the passing thru of silk thread, horse-hair, silk-worm gut, fine wire or catgut.

Radical or Operative Treatment.

1. Extirpation of the sac.

(a) By incision into the sac and cauterization of its walls by trichloracetic acid (Gifford's method) or by other corrosive agents.

(b) By excision of the sac.

2. A second form of operative treatment of dacryocystitis is the recently revived dacryocystorhinostomy or formation of an opening from the sac directly into the nose thru the lacrimal bone.

(a) By Toti's method the operator proceeds from the sac into the nose, whereas,

(b) In West's operation he makes a passage from the nose into the sac.

Variations in each of the above forms of treatment have and are being made in the greatest number.

Perhaps the line of treatment for dacryocystitis in greatest favor is: First, a trial of conservative methods —syringing and sounding; followed in the event of failure to cure, by excision of the sac preferably by the Vienna method or Meller's modification.

Probably no other subdivision of ophthalmology is so unsatisfactory in its results and has experienced more modifications of standard therapeutic procedures.

THE DIAGNOSIS OF TRACHOMA GRANULES UPON THE LIMBUS OF THE CORNEA.

KAZUO HIWATARI, M.D.

KAGOSHIMA, JAPAN.

This paper mentions sources of error that might account for the frequency of reports of trachoma granules occurring on the limbus.

In a former report[1] I had an opportunity to explain why trachoma granules, which are nothing but lymph follicles in my opinion, are very seldom found in trachomatous pannus, the trachomatous manifestation upon the cornea, altho they are the essential morphologic feature of trachoma in the fornix and the palpebral conjunctiva.

It seems to me a very curious fact that the trachoma granules, whose very rare occurrence in trachomatous pannus is accepted by every prominent ophthalmologist in our country, are more frequently to be met with in other countries.

Pascheff[2] from Bulgaria relates, for example, many trachoma cases with granules in the pannus. Recently I was informed personally by MacCallan of Egypt that "the trachoma follicles of the limbus are a frequent manifestation of trachoma in Egypt."

I can not determine immediately the question why such a difference occurs in the different countries.

But I may direct attention here to some points which seem certainly to be overlooked in the diagnosis of the trachoma granules upon the limbus, and might have some relation to the decision of that question.

I. In an inveterate trachoma case the affected conjunctiva gives rise sometimes to severe symblepharon, consequent upon its cicatrical contraction, such as to move the fornix towards the limbus. In such a case the trachoma granules which have been preexisting in the fornix might come to lie just upon the limbus as if they had developed there primarily.

But they must be strictly distinguished from those which have been primarily developed upon that part, as Prof. Ichikawa has previously pointed out with good reason.

II. During the course of trachoma there occurs the combined infection of the Koch-Weeks' bacilli or the pneumococci; which gives rise, especially in scrofulous individuals, to the eruption of minute granules upon the limbus that look somewhat like trachoma granules.

But they are phlyctenules or resemble infiltration in their nature, and are not true trachoma granules.

III. The correct diagnosis of the trachoma granules upon the limbus or the cornea must depend exclusively upon their microscopic examination; in which their well-known characteristics must be demonstrated.

Above all, however, the following structure should be especially noticed, so far as the trachoma granules are concerned, namely: The marginal portions of the granules, which represent usually a narrow zone, must consist of the small lymphocytes partly emigrating in the epithelial layer; while the wide interior parts, the germ center in my opinion, must consist of large lymphoid cells.

Such a distinct division of the granules into two zones histologically is always missing in the other similar infiltrations above mentioned, altho they might contain a greater quantity of the small lymphocytes.

Another point, which is necessary in the diagnosis of trachoma granules primarily developed upon the limbus, is the seat of the granules.

The subepithelial layer of the limbus, as I have pointed out in my previous paper,[3] shows a network of small ledges, resembling papillae in the sections.

Just in that part of the limbus the subepithelial layer is closely adherent to the subjacent tissue.

The genuine trachoma granules developed primarily upon the limbus must be seated microscopically just in that part or closely in its neighborhood at least.

A text illustration (Fig. 1) copied from a specimen, taken from a boy, aged fifteen, suffering from the typical trachomatous pannus, with a granule upon the limbus, may demonstrate more clearly what I have above noted.

BIBLIOGRAPHY:

1. Hiwatari, K.: Ueber das Wesen des Trachoms nebst einem Beitrag zur normalen Histologie der Konjunktiva. Acta scholae medicinalis universitatis imperialis in Kioto. Vol. III. fasc. I. 1919.
2. Paschеff: Trachoma verum corneae. v. Graefe's Archiv f. Ophthalmologie. Bd. LXXXVII. 1914.
3. Hiwatari, K.: Zur Histologie der Corneoscleralgrenze. Acta scholae medicinalis universitatis imperialis in Kioto. Vol. III. fasc. II. 1919.

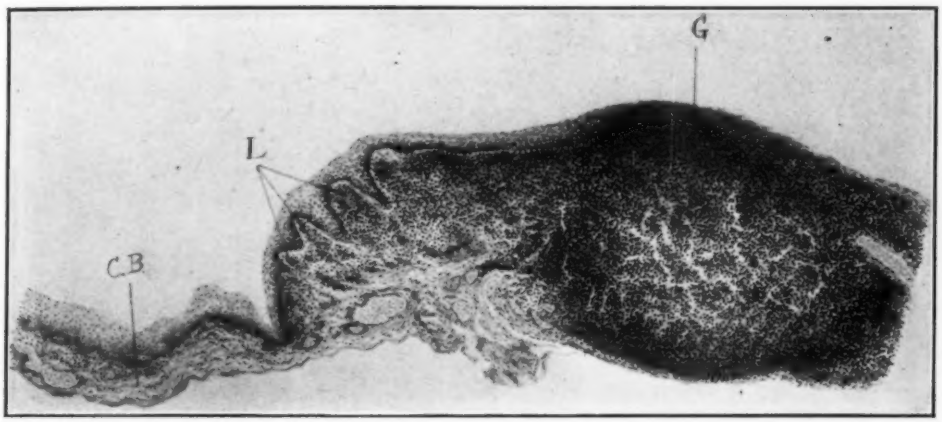


Fig. 1.—Trachoma granule in the conjunctiva at the limbus. C B, bulbar conjunctiva; L, ledges; G, trachoma granule.

NOTES, CASES AND INSTRUMENTS

A POSTERIOR SCLEROTOME.

ARTHUR G. BENNETT, M. D.

BUFFALO, N. Y.

The operation of posterior sclerotomy is generally performed with a Graefe cataract knife. The classical method is to make the incision halfway between the insertions of the external and inferior recti muscles, then to twist the knife 90°, so that on withdrawal, a cut at right angles to the original wound will be made.

I beg to present an instrument that will make a triangular wound by one motion more easily than the angular wound is made by the Graefe knife. The objection to the Graefe incision is the twisting of the knife in the wound, which, unless very carefully and skillfully done, is likely to stir up the vitreous unduly, and, if the knife be not properly twisted, fail to make an angular wound which results in too early closure, thus defeating the object aimed at. My instrument, which I call a "posterior sclerotome," is of tapering bayonet shape and hollow ground, which at 10 mm. from the point makes a triangular wound, each side of which is 2 mm. in length.

Fig. 1.—Bennett's posterior sclerotome for making an angular opening in the sclera.

In its use, all that is necessary is to put traction on the conjunctiva with the forceps used in fixation, in order that when the pull is released, the wound of the sclera and conjunctiva will not coincide. A quick stab to the necessary depth is then made and the conjunctiva released.

The accompanying drawing illustrates the sclerotome and explains the character of the wound it is designed to make.

The G. A. Terry Co., 356 South Elmwood Ave., Buffalo, N. Y., made this instrument for me, and carried out my suggestions in a very workmanlike manner.

ANOMALOUS SPIRAL LOOPING OF RETINAL ARTERY.

LEE MASTEN FRANCIS, M.D., F.A.C.S.

BUFFALO, N. Y.

The anomaly of the retinal artery illustrated, herewith, occurred in the right eye of a patient, who was referred for refraction. The patient, a woman aged 45, complained of headache but of no visual disturbances other than those usually accompanying refractive error and presbyopia. Her blood pressure was reported 110-74, with no heart murmurs or disturbed kidney function. Outside of headaches, her general health is good.

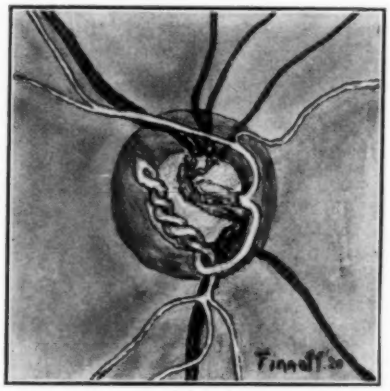


Fig. 2.—An anomalous retinal artery having spiral loop in the vitreous. (Francis' case.)

Refraction: O. D. V. = 6/12 + 1.00 Sp. ⊂ + 1.25 Cy. Ax. 15 V. 6/5-2, add + 1.00 Sp. V. Jaeger No. 1. O. S. V. =6/15 + 1.50 Cy. Ax. 180 V. 6/6-2+1, add + 1.00 Sp. V. Jaeger No. 1.

RIGHT EYE: The visual media are clear. The disc margin is clearly outlined with a moderately large centrally placed, physiologic cup. The artery emerges toward the nasal side, branching near the cup brim and crosses one venous branch. Just as it crosses the trunk of the vein, near the disk's edge, the artery is thrown into a loop of five twists, which extends about three millimeters forward into the vitreous. The tip of the loop may be seen with a +10.00. The remaining retinal circulation is normal.

The left eye is normal, showing no vascular or other abnormalities.

The most interesting feature of the case, outside of the vascular anomaly, is the presence of an arterial pulsation, synchronously with that of the radial pulse, strikingly noted at the tip of the vascular loop. No other retinal arteries pulsate nor is there a venous pulse in either eye. A similar case is illustrated on page 2931 in the American Encyclopedia of Ophthalmology, Volume 4, reported by Kipp.

This case was also seen by Dr. W. C. Finnoff, who kindly made the accompanying illustration. (Fig. 2.)

PULSATING EXOPHTHALMOS.

DEWAYNE HALLETT, M.D.

NEW YORK.

Mrs. L. K., 74 years of age, suffering from nephritis, was referred to me by Dr. George W. Whitney, on account of a gradually increasing ptosis of the left upper lid.

First examined at my office April 11, 1918. There was a left ptosis, dilated and inactive pupil, slight proptosis, central retinal atrophy from an old hemorrhage, vitreous opacities, incipient cataract, vision reduced to the ability to count fingers, cornea clear and no pain. The blood pressure was high. The intraocular pressure was increased, and a miotic was prescribed.

About April 28th an acute glaucoma developed, with chemosis, edema of the lids, pupil dilated, no reaction to light, proptosis, no vision, tension of eyeball 68 mm. Hg., with the McLean tonometer. A stronger miotic was prescribed.

May 4th. Developed a hammering and roaring noise in the head, synchronous with the pulse, complete ptosis, tortuous veins in upper eyelid, globe pushed forward and downward, and the inferior conjunctiva a baggy edematous mass prolapsed onto the cheek. Pupil small and intraocular tension within normal limits.

June 4th. With the ear placed over the frontal sinus region, over the eye, or on the left temple, a bruit was very audible. Pulsation visible. Digital pressure over the angular vein at the upper inner portion of the orbital margin caused the bruit to subside objectively and subjectively, and it likewise ceased upon compression of the carotid artery in the neck.

June 10th. The left common carotid was ligated by Dr. Walter G. Crump, during which operation a stethoscope was in position above the eye; and the bruit was observed to nearly cease, only to return in a moment to about one-quarter of its former intensity. After the neck wound was closed and the field about the eye prepared, the angular ophthalmic vein was ligated at the inner margin of the orbit, and this was followed by a complete cessation of the bruit.

About a month later, during which time the patient was comfortable, except for the consequences of nephritis, including marked edema of the extremities, which had been a constant symptom, the bruit gradually developed on the other side of the head, with pulsating exophthalmos. Experimental digital compression of the right carotid caused coma. No further surgery was proposed, and death occurred shortly thereafter, as the patient wished that it might.

AMAUROTIC FAMILY IDIOCY.

J. A. KEARNEY, M.D.

NEW YORK.

R. W., a male child of Jewish parentage, eighteen months old, was admitted to Gouverneur Hospital by the ambulance of the hospital with convulsions Aug. 8th, 1920. Thru the

courtesy of Dr. George H. Hyslop, I was asked to examine him.

The grandparents are all living and well and no history of insanity in either family line could be had by questioning. Consanguinity of parents denied. The patient is the youngest of five children. There were no miscarriages and the other children are in good health. The father of the child is living and well. The mother at about the eighth month of pregnancy with this child had a severe attack of influenza. She died when the child was six months old following a thyroidectomy operation.

The child was said to be normal until three months old when the parents noticed that he could not see, and from this time onward he did not seem to grow as fast as the usual normal child. He never attempted to sit up, nor crawl, nor walk, and was perfectly quiet until six months ago when he developed convulsions that occurred quite frequently.

He was admitted to the hospital with convulsions, and upon examination the temperature registered 103° and he had diarrhea. The temperature returned to normal twelve hours after admission. While under observation at the hospital he lay silent and motionless; but any sudden noise would induce spasmodic movements of the extremities and at times a slight general convulsion. The child died in the hospital Aug. 14th, 1920, six days after admission.

PHYSICAL SIGNS: A large child, well nourished, small head, the lateral diameters greatly exceeding the antero-posterior ones, six teeth, palate normal. Wide costal angle, epiphyses of long bones large, muscles doughy and pit upon pressure, feet held in slight carpal spasm, hands clenched, fingers tapering in type, flexed except the proximal phalanges which were extended, deep reflexes spastic, no Babinski.

EYE EXAMINATION: The palpebral fissures were slightly wider than normal, eyes stare and look straight ahead. He never winked the lids nor moved the eyes from the time of admission. Pupils semidilated, respond sluggishly to light stimuli. Media were clear, optic discs were extremely pale thru out, but showing no neuritic signs, the blood vessels were obviously normal. Greyish white symmetric circular areas were observed in the region of the maculae, eight mm. in diameter with furred edges. In the center of each was a rose-colored spot, one and one-half mm. in diameter. The surrounding retina appeared muddied.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

ST. LOUIS OPHTHALMIC CONFERENCE.

May 14, 1920.

DR. HAYWARD POST, Presiding.

Localization of Foreign Bodies in the Eye.

DR. M. B. TITTERINGTON (by invitation) read a paper on this subject.

DISCUSSION: Dr. John Green: In a number of my patients Dr. Titterington has localized very accurately intraocular foreign bodies. One patient had sustained an injury a year before I saw him. His attendant removed a foreign body from the cornea. Subsequently the eye showed a discoloration of the iris and several dark brown spots on the anterior lens capsule, accompanied by visual failure. Dr. Titterington localized a minute fragment in the ciliary body. It was exceedingly important that the localization should be as accurate as possible as we were probably dealing with a foreign body that was encapsulated and it was necessary that the small magnet be introduced as close as possible to the foreign body. Thru a very small incision at the indicated site the tip of a small hand magnet was introduced and on the second attempt a very small particle was removed. The patient did well tho eventually a traumatic cataract developed, which was extracted. Patient has fair vision, 20/120, which probably could be improved by division of the membrane. I advised against it because of the fact that the other eye was perfectly good.

Another patient in whom a foreign body was disclosed by the doubly sensitized film, was interesting also in that a competent roentgenologist had made a plate some two years before and found no evidence of a foreign body. In this particular case the question arose as to whether any operative interference was justified.

Recent experience has seemed to show that our former views as to the removal of an eye in which there is a foreign body may have to be modified. In the presence of an intraocular foreign body most ophthalmologists will insist that the foreign body be removed, or if this is not possible, that the eye be enucleated. On the other hand, a number of men, especially those who have had overseas experience, are inclined to think that such an eye may be retained. This view is doubtless due to the very small number of cases of sympathetic ophthalmia seen during the World War.

My patient had had a combined extraction performed by another surgeon; the iris was muddy brown and tremulous and there was floating material in the vitreous. Vision p. l.; field defective. I told the patient there were three courses open; first, that no operation be performed in view of the fact that the eye was painless and unirritated, and that there was no irritation of the other eye; second, that an attempt to remove the foreign body might be successful, but, on the other hand, might lead to the loss of the eyeball; third, that the globe be removed. After explaining the *pros* and *cons,* the patient decided to leave well enough alone. I am rather inclined to think he adopted the most rational course.

Dr. W. H. Luedde: A lateral view, to determine the presence of a foreign body, may prove disappointing; in a recent case the shadow of the fragment of steel was completely masked by the shadow caused by unequal density of the cranial bones and it required an anteroposterior view to discover the foreign body. It appears to be unsafe in any case to be satisfied with a roentgenogram taken in only one direction.

This same case illustrated another difficulty. A localization was made by Dr. Titterington with the result that the horizontal and vertical projections on the chart did not agree as to whether the fragment was just inside or outside of the sclera. The diagrams were based on the average size of the eyeball and a variation of a millimeter in actual size may

thus lead to confusion and error. In this case, the fragment had entered thru the cornea and lens, the clouding of the media making it impossible to get a view of the fundus with the ophthalmoscope. On exposure to a giant magnet, there was a strong "pulling" sensation so that the globe was opened in an attempt to deliver the fragment. In spite of the introduction of a metal tip deeply into the vitreous, no fragment presented itself. The operative wound healed perfectly and the slight inflammatory reaction indicated that the fragment was, after all, lying in the orbital tissues having probably passed entirely thru the globe.

Perhaps a procedure noted in the special report of Dr. M. F. Terrien on "The Use of Radium and X-Rays in Ophthalmology" (1919), might be of some help. He suggested a study of the change of position of the shadow produced by rotation of the eyeball. It is quite likely that this fragment was so close to the sclera that it would have moved with the ocular movement even tho truly extraocular.

In another case X-ray localization was practically out of the question, due to the large number of fragments. A tray loaded with detonating caps exploded while the workman was carrying it. His face, body, and lower limbs contained many fragments. Both eyes were perforated at several points, but the intraocular fragments seemed to be causing no trouble. Conservative treatment resulted in an unexpected degree of vision in each eye in spite of opacities in both lens and cornea due to penetrating wounds and the retention of tiny fragments.

This brings up the question of the retention of fragments in the eye. Several years ago a man was brought to me who had sustained a severe ocular injury, the result of an explosion in a coal mine. The eye seemed hopelessly lost. There were several fragments clearly visible on the iris. Nevertheless, the eye quieted and was retained. No general rule can apply to all cases. Each must be judged after close observation. According to recent experiences, fragments of copper are particularly liable to make trouble.

Dr. Wm. F. Hardy: Cases calling for good judgment are those in which one is undecided, even with a roentgenogram, whether the foreign body is inside or outside the globe. I have in mind two cases; one Dr. Luedde saw with me ten years ago, in which the X-ray picture had failed to definitely localize the foreign body. On enucleating the eye, my scissors hit something metallic. The foreign body was partly in and partly outside the eyeball.

Another case was one I had at the Barnes Hospital, being that of a boy who had been shot in the eye with B.B. shot. Nothing could be seen in his eye because the lens was cataractous. There was great doubt as to whether the foreign body was located in or outside the eye. I watched him for several months, and finally decided it would be well to remove the eye. The shot was inside the optic nerve and partly in and partly outside the globe. I hit it with my scissors when I enucleated. I feel, therefore, that such cases are those where the best judgment should be used on the part of the ophthalmologist.

Dr. F. E. Woodruff: It seems to me altogether too early to base any opinion on the advisability of leaving a foreign body in the eye, from experience in the war. Accidents frequently happen in uneducated men, who move about from place to place, and we cannot afford to take a chance and let an ignorant man go away from competent medical attention with a foreign body in the eye. These men are very prone to minimize their troubles and after sympathetic inflammation has started it is too late to do anything. One is safe in taking out a foreign body and one is also safe in removing the eye with an imbedded foreign body. To let a man go away from observation with a foreign body in the eye is extremely hazardous, as far as the fellow eye is concerned. When there is a suspicion that a fragment of glass is in the eye, it is often of advantage to take a bit of the glass and place it on the X-ray plate to determine whether the suspected glass will make a shadow, for all glass does not do so.

Dr. John Green: In regard to gunshot wounds, it seems to me that one is pretty safe in retaining the globe. I

have two patients who sustained gunshot wounds, one eleven and one twelve years ago. In one there was a double perforation of the globe and the localization showed the shot two or three millimeters behind the eyeball, probably not in the optic nerve. In the other, it was a question whether there was a double perforation or whether the shot was in the sclera. A double exposure on the same plate, the one made with the eyes rotated down, the other with the eyes rotated up, showed two shot shadows, so it was inferred that the shot was in the sclera. Both of these eyes are blind, but both of them for the most part, have been quiet.

Dr. Wm. F. Hardy: Dr. Green and Dr. Woodruff both brought up points which remind me of a case I saw. A man was struck in the eye with a No. 6 shot, a glancing blow, penetrating the lower lid. He was evidently looking up when the shot entered, as the penetration occurred in the equatorial region. When I saw him the vitreous was so full of blood that no details could be seen at all. He came to me because he had been to another ophthalmologist who had urged immediate removal of the eye. As the eye was never red, no irritation present, no wound of entrance to be seen, except the wound thru lid, and in view of the fact that he had no symptoms whatever, except loss of vision, I decided that I could with safety keep the eye in his head. An X-ray localization was made and it showed a shot in the eye. I feel, with Dr. Green, that in such cases it is not incumbent upon us to urge enucleation.

Dr. Lawrence Post: The practice of the British at the eye base in Rouen was to remove all foreign bodies from the globe, whenever possible. The method employed was to place the patient, suspected of having a foreign body in the globe, before a giant magnet in the hope of drawing the metal fragment into the anterior chamber. If no result was obtained, localization plates were made.

Dr. Titterington: (Closing) Instead of plates, we often use films which have sensitized emulsion on each side. Employing an intensifying screen, which is covered with a fluorescent salt, as soon as the X-ray light strikes the salt, it fluoresces and it is with this fluorescence that the picture is really made, and not with X-ray light. One of these intensifying screens is put on either side of the film. The exposure is only one-eighth of what it would be with an ordinary plate. If any metallic body is traversed by the X-ray, there is a secondary radiation given off and if the particle is very small and is submitted to the rays long enough, these secondary rays will blot it out. Dr. Luedde spoke of not being able to locate foreign bodies on account of being situated over a bony ridge. I have had that same experience. Now I always make two lateral exposures at different angles. Sometimes both exposures are made on one plate.

Disorders of Lacrimal Drainage.

Dr. H. D. Lamb read a paper upon this subject which is published in full, p. 197.

Discussion: Dr. J. W. Charles: While treatment is usually unsuccessful, the older I grow the more I feel that we ought not to give up, because occasionally we do have success. The first patient I had was a boy of nineteen. He had probably a congenital closure of the nasal duct since his history showed a lacrimation from babyhood. I found that he had a slight dacryocystitis, and I could get a probe almost into the nose and there it stopped. After several unsuccessful attempts I entered a No. 8 Bowman as far as it would go, and bore down with all my weight. There was a crash, the patient fainted, but I got thru. On his return home I provided him with a No. 6 Bowman, which I taught him to pass. He went to New Mexico, and wrote me a year after that he did not have any more trouble, and he has not had since. He did not use the probe after the first year.

One can occasionally teach parents to cleanse the sac of a child with dacryocystitis. I have now a child of eight that has been operated on by a rhinologist and oculist without success. In the past she has had occasional lac

rimal abscesses with fistula. I have taught the father to syringe the sac and he is keeping it thoroly clean; and I believe that the child is getting rid of the infection and later, if the sac no longer discharges pus, I shall, as a final resort, make an endeavor, with the assistance of a rhinologist, to secure drainage by means of one of the newer methods of making a window into the nose.

Dr. Wm. H. Luedde: There is so much to be said about our experiences with dacryocystitis that general discussion may be dulled by too much detail. The importance of these cases was deeply impressed by the experience of a young man who lost an eye from acute panophthalmitis following a penetrating wound. He had a double dacryocystitis apparently due to congenital absence of both lower puncta. The treatment of that case by dacryocystorhinostomy was described by Dr. W. M. C. Bryan and myself in the Annals of Ophthalmology, July, 1912.

Dr. John Green: Eversion of the puncta due to chronic dermatitis in elderly persons is often difficult to manage. I am never able to prognosticate whether slitting the canaliculus or taking out a triangular shaped piece, according to the technic of Dr. Charles, is going to be beneficial or not. Some cases, so treated, drain perfectly. Others, in which there is contact between the slit or excised canaliculus and the globe, have just as much epiphora after as before the operation. I assume, of course, that the lacrimonasal canal is patent. I do not believe that invariably an ectasia of the sac remains after reestablishment of drainage. I have two cases in mind in which there was sufficient elasticity remaining in the sac to bring about contraction, after I had done the combined operation of curettage and rapid dilatation. Dr. Lamb spoke of the uselessness of any method short of excision of the sac in trachoma of the sac. I am not sure that that is strictly the right point of view. We know that abrasive methods in trachoma of the lids are very efficacious. It is conceivable that abrasive methods with burs, reamers, and curettes may be efficacious in trachomatous inflammation of the sac.

I am one of the believers in the early passage of a small probe in infantile dacryocystitis. It seems to me unwise to continue syringing in these cases for a long period in the hope that eventually patency will be established. That does occur sometimes, but it often involves months and months of treatment. It seems to me that the judicious passage of a small probe, which may be repeated, is the preferred method. This is done under local anesthesia. I have never had to pass the probe more than three times, and I always allow long intervals to elapse between probings. Very frequently, the single passage of No. 2 or No. 3 Bowman (I have never gone above No. 3 Bowman) will restore patency and the trouble is absolutely at an end. I do not slit the canaliculus.

Dr. Wm. F. Hardy: It has always been a mystery to me why excision of the sac has been so little practised in this country when it is so popular in Europe. I have not had many cases in which I have removed the sac, but in those in which I have done it, I have gotten satisfactory results. The one Dr. Post removed in the Clinic was the largest dilated sac I have ever seen. Four months later the patient reported with a perfect result. The operations such as are now in vogue, and which Dr. Lamb showed us are very old; while they do not appear unsurgical, they do seem unnatural to me. I cannot conceive of them curing all or even a large majority of the cases; and where we have chronic, intractable dacryocystitis, it seems to me that there is less trauma and less surgery done in excision of the sac than by any other method. The epiphora, which is the thing to be feared after excision, does not materialize, except in a small proportion of cases; and certainly the chance of regurgitation of purulent material into the conjunctival sac is absolutely obviated, which more than compensates for the inconvenience of an epiphora, often transitory.

Dr. Lawrence Post: I agree entirely with Dr. Hardy. When I have had very long drawn out cases, which re-

fused to get well with the usual methods of probing and irrigation, I have usually resorted to excision of the sac. The results have been so good that I have never felt the need of any other procedure. Epiphora has seldon lasted longer than six weeks.

Dr. Lawrence Post read a paper entitled: "A Study of the Etiology of Periodic Ophthalmia in Horses." To be published in full in this journal.

John Green,
Secretary.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

Dec. 6, 1920.

Dr. E. B. Heckel, President.

Enlargement of Pituitary Body.

Dr. Edward Stieren presented a forty year old man, a printer by occupation, whose right eye had gradually become blind in the past six months. In addition he complained of a deep seated pain in the right temporal and frontal regions, some loss of memory and loss of sexual power.

When first seen Oct. 11, 1920, the pupils were normal in size and reaction; tension of each eye was 26 mm. (McLean), R. V. 1/40, L. V. 6/6—, with —1.D.Sph. The corneae, lenses and media were clear. The temporal half of the right optic nerve was pale,

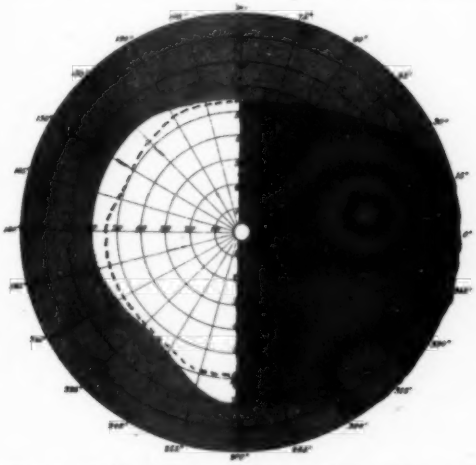


Fig. 1.—Enlargement of pituitary body with complete temporal hemianopsia in the right eye. Chart of field taken October 11, 1920, with 10 mm. object.

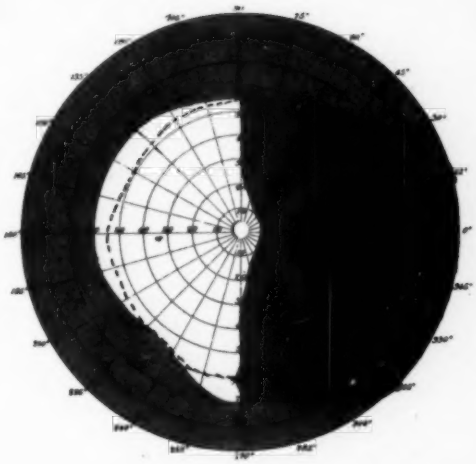


Fig. 2.—Enlargement of pituitary body. Extension of field of the right eye almost 10 degrees beyond the fixation point. Chart taken November 24, 1920, with 2 mm. object.

and there was a narrow pigmented crescent at the temporal edge of the disc. The left nerve head was normal. No nystagmus. Perimetric examination disclosed a complete temporal hemianopsia in the right eye; the field of the left was normal for form and colors. (See Fig. 1).

Neurologic examination by Dr. W. H. Mayer: Arm, abdominal, cremasteric and patellar reflexes are present and normal. There is no Babinski. No evidence of any cranial nerve palsy nor any muscular twitching or tremor. His physical development is good with a rather undue prominence of features, a definite thickness of his fingers with a tendency toward the trident hand. He is short and heavy set, and has the straight lumbar spine so often noted in endocrine conditions. The thickness of the bone shafts appear unusually heavy both to palpation and X-ray examination while the epiphyses are normal. There is a ring of fatty distribution in the abdomen above the umbilicus (Marie's sign). The gonads are well developed and show no abnormality. X-ray of the head shows a definite thinning of the floor of the sella, the anterior and posterior clinoid processes are indefinite and appear eroded.

Laboratory examination: Blood and spinal Wassermann negative; urine negative; blood count, Hb. 95%,

R.B.C. 5,000,000, W.B.C. 8,000, Polys. 49%, Mono. 26.5%. The blood sugar is within the normal point. The sugar tolerance test shows the patient to be able to ingest 500 grams of glucose without functional glycosuria.

From the above, a diagnosis of enlargement of the pituitary was made. Following the observation of Timme that a hypertrophy of the pituitary occurs in a pluriglandular syndrome, and that the characteristic disturbances are due to an inability of the normal pituitary to combat antagonistic secretions elsewhere in the chromaffin and interrenal systems, it was decided to administer pituitary gland substance.

This was given as a test in the hope of relieving the overtaxed pituitary and ultimately permitting it to recede to a more normal size. Whole pituitary gland, eight grains every 24 hours, was begun Oct. 21 and continued without interruption until the present time, a few days over a period of six weeks.

As a result there has been noted a gradual but undoubted improvement in several respects. The field of vision in the right eye has advanced almost ten degrees from the fixation point on the nasal side, slightly less above and below. (See Fig. 2). The headaches have been entirely relieved and both the patient and his wife note an improvement in his mental and physical condition.

Ammonia Burns of the Cornea.

Dr. E. E. Wible reported as follows: A gang of eight men were operating a "skull-cracker" which is an immense iron ball, elevated to the top of a derrick and allowed to fall upon scrap metal of various kinds. This reduces it to fragments suitable for use in the manufacture of open hearth steel. A full ammonia cylinder, supposedly empty, had been "scrapped" and when crushed by the "skull-cracker" liberated the ammonia in concentrated form, enveloping the entire gang. The men had their sleeves rolled up and shirts opened and sustained burns of all the exposed tissues, including the corneas.

Four of the men sustained but slight burns of the first degree, and left the hospital later the same day. They complained of a slight burning in the throat and eyes. The treatment consisted of a single instillation of a 4% sol. of cocain, irrigation with boric acid and instillations of Ol. Ricini every four hours.

Case 5. In addition to the general burns of second degree, suffered a severe chemical burn of the palpebral and bulbar conjunctivae and of the portion of the cornea corresponding to the palpebral fissure. This patient was discharged from the hospital in 10 days, not entirely recovered but with corneas perfectly clear.

Case 6. Sustained 2nd and 3rd degree burns of the exposed portions of his body and a severe burn of both corneas which quickly became steamy. He died rather unexpectedly on the fourth day.

Case 7. Sustained a severe burn of both corneas which first became hazy, then "steamed" and later developed a china whiteness with consequent loss of vision. When patient died on the tenth day, the corneas had not yet begun to slough.

Cases five, six and seven received the following treatment:

4% sol. cocain (one instillation), irrigation with a warm boric acid every 4 hours, two drops of a 1% sol. atropin sulphat, t.i.d., one drop of Ol. Ricini hourly, and cold compresses to reduce swelling, reaction and pain.

Case 8 sustained first and second degree burns of the skin surfaces and a severe burn of the corneas.

There was a deep sloughing of the right cornea three weeks after injury. This was about 4 mm. in diameter. It was so deep that perforation was imminent, covered the pupillary area, and was very slow in healing.

Fourteen days after injury there were three small areas of sloughing in the left cornea. The healing was very slow and was not completed until four weeks later.

The scarring was quite marked, altho dionin and hot compresses were employed in the attempt to limit the extent and density of the cicatrices. He was discharged from the hospital on the 120th day.

Discussion.—Dr. E. B. Heckel: I am not in favor of the employment of

cocain in these cases. Holocain in my opinion would be preferable, altho I do not employ either in this type of case. We begin the use of continuous hot compresses immediately, thereby diminishing local pain, assisting nature in maintaining the vitality of the parts and hastening the healing proc-

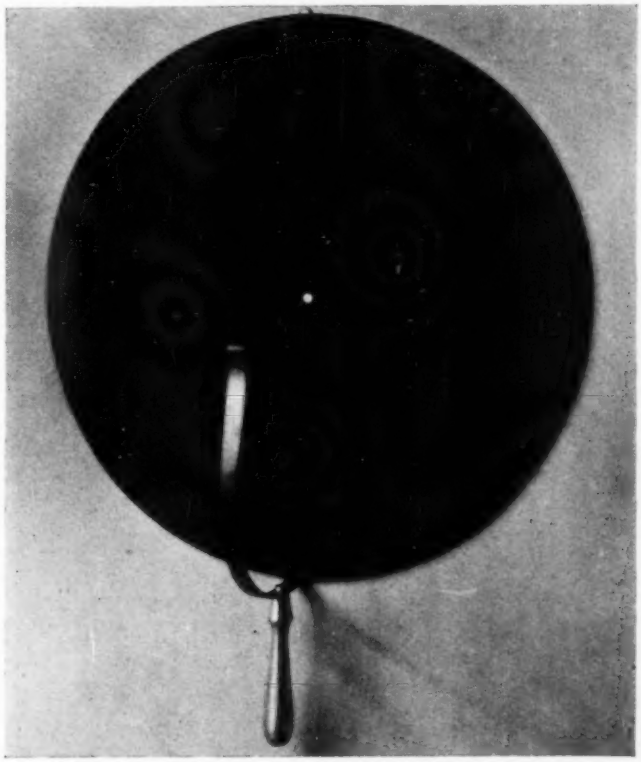


Fig. 3.—Van Kirk's modification of the Peter Campimeter front view.

ess. We employ sterile olive oil in these cases instead of castor oil, instilled every two hours.

Dr. Stanley Smith: We saw many cases of this type during the war and learned to be very conservative in our prognosis, as many cases in which the burn at first seemed very slight, developed later extensive and deep sloughing, owing to the penetrating character of the caustic.

Bilateral Conical Cornea.

Dr. Stanley Smith reported the case of Miss M. E., age 29, well developed and in excellent general health, who for some time has been physical instructor at a large institution in this city.

Sixteen years ago, while in 9th grade, grammer school, the vision began to fail in both eyes. She was attended at that time by Drs. Burroughs, Park Lewis and E. E. Blaauw of Buffalo. Dr. Burroughs made several muscle adjustments, possibly with a hope of diminishing pressure.

The case came under my observation in February, 1920, at which time there was a small corneal ulcer O. S. This healed quite promptly. The visual acuity at present is, O.D. 6/60, O.S. 6/20 eccentric; the deformity of the corneas is quite marked. She is now using a weak sol. of eserin salicylat as a possible aid to drainage.

Discussion.—The various surgical procedures, sometimes employed in these cases, cauterization of the tip of the cone, resection of a portion of the cornea, etc., were discussed.

However the general opinion was essentially conservative and in favor of the continued employment of miotics.

A Modified Campimeter.

Dr. V. E. Van Kirk presented a new campimeter, a modification of the Peter instrument, describing it as follows:

A ring of steel wire is mounted in a handle and face piece, so made that the center of the ring is 6½ inches from the patient's eye. The ring is covered with white muslin, upon which the design of the Peter instrument is drawn. Over this is sewed a layer of black velvet; a small white button is secured to the center of the velvet.

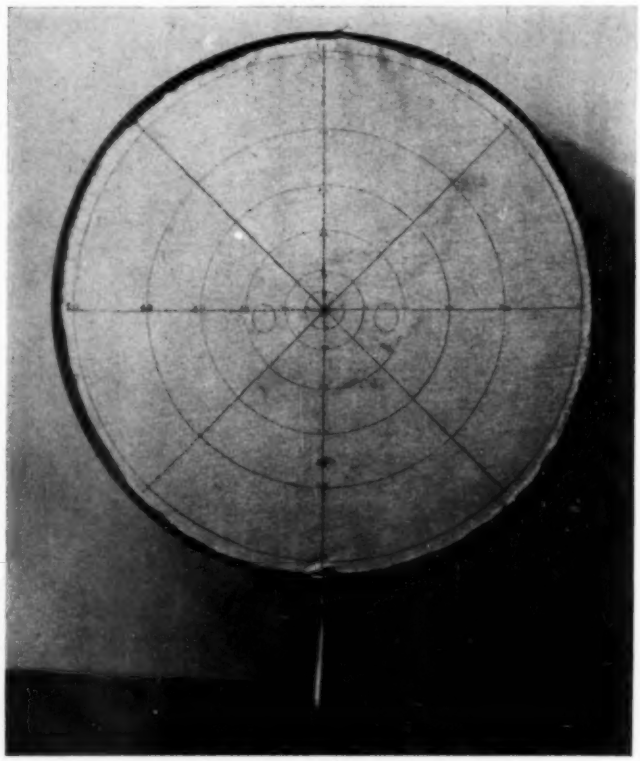


Fig. 4.—Van Kirk's modification of the Peter Campimeter rear view.

In the use of the Peter campimeter the following defects were found:

1. The board was not an even dull black.
2. The fixation point was not prominent enough.
3. The design on the face of the board distracted the patient's attention.
4. In repeated examinations the design on the face of the board aided the patient's memory.

This model was then designed to overcome the defects and to retain the great advantages of the original Peter instrument.

This gives an even black background with only the point of fixation and the test objects showing. A very slight pressure of the test object shows its position on the design on the back of the screen.

Hunter H. Turner.

COLORADO OPHTHALMOLOGICAL SOCIETY.

November 20, 1920

Dr. G. L. Strader presiding.

Disciform Keratitis.

W. C. Bane, Denver, presented a woman aged twenty-seven years whose left

eye had become inflamed about the middle of October, 1920, altho there was no pain until the first of November. For five days and nights before consulting Dr. Bane on November 9, there was very severe pain in the eye and left frontal region. On this date the vision of the left eye was 5/20. There were moderate circumcorneal congestion, slight discoloration of the iris and a disc-shaped haze in the substance of the cornea about 4 mm. in diameter, its center being about 1 mm. below and outward from the center of the cornea. There was no loss of corneal epithelium. The pupil dilated readily under atropin. The tension was about 40 mm. of mercury. The treatment consisted of calomel and aspirin internally, and heat and two per cent dionin solution locally. On November 13 the tension was 43 mm. Under eserin and one per cent guaiacol the tension on November 16 was 24 mm., the vision of the affected eye 5/60 plus.

DISCUSSION. G. F. Libby, Denver, remarked that the case differed from typical disciform keratitis in the absence of dense central infiltration.

Edward Jackson, Denver, said that it also differed from other cases which he had seen in its rather acute onset. He had seen two cases of disciform keratitis that were clearly syphilitic and yielded to antisyphilitic treatment. Weeks had reported a case with histologic examination.

G. L. Strader, Cheyenne, Wyoming, had presented a case of disciform keratitis to the society eight or ten years ago. It started with an injury from a cinder at the center of the cornea. After treatment for six months, an ulcer of almost pin point size appeared at the center of the disturbance. This yielded to the application of fuming nitric acid on a sharpened match, and within two or three weeks after this the case was entirely well so far as the inflammation was concerned. An opacity was left but the vision was fairly good.

Chorioretinitis Juxtapapillaris.

W. C. BANE, Denver, presented a boy aged sixteen years who had come on October 9, 1920, complaining that on the previous day he had noticed that the vision of the right eye became suddenly very much blurred. There was very little discomfort. At examination the vision of this eye was 5/60, of the left 5/6 plus. There was a marked retinitis extending very slightly beyond the right disc. There was a trace of albumin in the urine. Two weeks after the first examination the swelling of the disc was more marked, the media were somewhat hazy, and there was a gray swelling of about a disc diameter at the macula, with a dark spot in the center. The vision was still 5/60. When the pupil was again dilated on November 8, a ring of deposit was found on the anterior capsule of the lens, and there was an increased haze in front of the macula. On November 15, the macular lesion consisted of an oval blue gray membrane with notched edges, and smaller than the disc. This membrane was to the temporal side of the fovea. The media had become slightly clearer.

DISCUSSION. Edward Jackson, Denver. When by the courtesy of Dr. Bane, I first saw this case the ring of opacities on the anterior capsule made me think of Vossius' ring. But the boy had no history of injury. Altho the ring was not like the usual spots at which the iris begins to pull loose, it must no doubt have been deposited between the two periods of employment of atropin. The case is likely allied to chorioretinitis juxtapapillaris. I should expect some pigmentation at the site of the lesion later. It might be worth while to take the field.

D. H. Coover, Denver, suggested that a Wassermann test should be made.

Iridocyclitis with Hypopyon in Old Injured Eye.

W. C. BANE, Denver, presented a man aged sixty-three years, whose right eye had been injured in 1892 by a glancing blow from a large piece of steel. Cataract had resulted, and there had since been only light perception in that eye. There had never been any further trouble with the injured eye until about the middle of October, 1920, when the patient was referred to Dr. Bane with a diagnosis of iritis and keratitis. There was then marked circumcorneal injection, with 1 mm. of exudate at the lower angle of the anterior chamber. There was an old horizontal opacity 4 mm. in

length below the center of the cornea. The tension of the eye was 33 mm. of mercury. All the patient's teeth had been extracted for more than a year. The vision of the left eye was normal with correction. In spite of the injection of 25 minims of a 1 to 1300 cyanid of mercury solution subconjunctivally together with the instillation of atropin, the pupil had not dilated at all. The patient was sent to the hospital and given aspirin and calomel and salines. On November 18 the exudate in the anterior chamber had diminished to 0.5 mm. in depth. There had been severe pain off and on, and the exudate had since increased to 1.5 mm.

DISCUSSION. A. C. Magruder, Colorado Springs, favored removal of this useless eyeball.

W. H. Crisp, Denver, thought that there might be a calcareous or partial osseous degeneration of the uveal tract.

Retinal Hemorrhage.

A. C. MAGRUDER, Colorado Springs, presented a boy aged sixteen years who had had a series of retinal hemorrhages in both eyes. About the middle of October, while playing football, he fell on his face with a number of boys on top of him, the principal weight being across his waist line. A few minutes later he became dizzy and faint, and things got black before his eyes. After resting for two hours he went home and to bed. A few days later, he discovered that he could not read with his right eye. After a tonsillitis which began on November 1, he began carrying newspapers again on November 8. After carrying the full route on November 13, he went "hooking" (sledding) with another boy, and suddenly noticed the blood flowing over the retina of the right eye. He was a large healthy youth with a negative history except that he had had several attacks of tonsillitis after exposure. Thoro general examination was negative. The blood pressure was 128 mm. of mercury. On November 15, among the traces of former hemorrhages was a band of retinitis proliferans three disc diameters long. The patient's mother had had asthma nine years before coming to Colorado eight years ago.

DISCUSSION. W. C. Finnoff, Denver. By exclusion tuberculosis is about the only cause we can find in the case. In testing the case for tuberculosis the tuberculin should only be used as a therapeutic, not as a diagnostic measure, because the only reaction to tuberculin we should be likely to get would be the hemorrhages, which we are already having.

Neuroretinitis.

A. C. MAGRUDER, Colorado Springs, presented a man aged sixty years who had come on October 27, 1920, complaining that each morning he had been troubled with waves of light and darkness passing before his eyes, and that he seemed to be looking through a dark veil. There was no pain or redness. The patient was an old tuberculous subject with a history of many pulmonary and nasal hemorrhages. He had also been a rather heavy drinker. In the right eye there was a very extensive old choroiditis. No fundus changes were discovered thru the dilated pupil on November 3, and the vision of the left eye was 20/20. On November 8 the vision of the left eye was reduced to 20/100. There was a definite blurring of the optic disc, there were two white areas above the disc and the veins were large and tortuous. The swelling of the optic disc and the striations of its margins had become gradually more pronounced, and some few white patches had appeared along the retinal veins. The right antrum had been washed out, yielding a quantity of pus, and four infected teeth had been removed. The Wasserman test was negative, as was urinalysis. The ethmoids and sphenoids were also diseased, but the patient refused to have anything further done than the washing out of the antrum.

DISCUSSION. W. C. Bane, Denver: I should insist on having the ethmoids and sphenoids cleaned up or ask the patient to get another doctor.

G. F. Libby, Denver. The case strikes me as one of multiple infection, with the tuberculous influence possibly in the background.

W. H. Crisp, Denver, suggested that in spite of a negative Wassermann test a man who boasted of heavy drinking was likely to have had syphilis.

Edward Jackson, Denver, thought of syphilis as a likely cause in the right eye. The left eye with its marked elevation of the disc suggested the possibility of a vascular lesion in the nerve head. It is at the same time possible that the trouble in both eyes could be explained on the basis of focal infection.

Chronic Simple Glaucoma.

E. T. Boyd, Denver, presented a man aged fifty-three years, who had chronic simple glaucoma in both eyes. Pilocarpin failed to control the tension which ranged from 40 to 60 mm. of mercury. Eserin sulphat controlled the tension of the right eye, in which the field of vision was slightly contracted but the central vision was reduced to 20/200 by a corneal scar. In the left eye, only central vision remained, but this with correction was 20/30. Eserin did not influence the tension of this eye, which on September 23 had been 50 mm. On September 24 cyclodialysis was done, and subsequently no miotic was used in this eye. On September 26, 28, and 30 the tension remained elevated. On October 4 the tension was 20 mm. of mercury, and it had so remained since that time.

Caustic Burn from Water Glass.

E. T. Boyd, Denver, presented a man aged thirty-one years, who on November 16, while sealing boxes with water glass applied upon a brush, had splashed a liberal quantity of the water glass into his left eye. When seen one hour after the accident, the eyelids were slightly swollen, and the man was evidently suffering pain. On opening the eye an immense chemosis was found to involve the lower external quadrant of the bulbar conjunctiva. On depressing the chemotic swelling and everting the lower lid, some water glass (about the consistency of heavy mucilage) was seen. This was removed with a dropper, the eye flushed with a weak solution of vinegar, atropin sulphat solution instilled, the eye filled with olive oil, and a dressing applied. In the course of the next two or three days there was evidence of tissue destruction, the appearance being that of a chemical burn. At the end of three days the inflammatory condition was much improved, but the lower conjunctiva was still edematous. Silicat of sodium, the watery solution of which is known as water glass, and is extensively used in sealing pasteboard boxes, coating labels, and preserving eggs, is strongly alkaline and is escharotic to the tissues of the eye. On account of the weight and viscosity of the solution, burns by water glass mainly involve the lower part of the eye. The cornea is not usually involved because the irritant does not remain in contact with it for a sufficient length of time. There is little tendency to the formation of symblepharon.

Traumatic Closure of Canaliculi.

E. T. Boyd, Denver, presented a man aged twenty-two years who on September 6, among other injuries received in a railroad collision, had had a vertical wound, just internal to the inner canthus of the right eye, involving the canaliculi. When the patient was first seen on September 30, there was traumatic epicanthus, the upper and lower canaliculi were closed, and the eye was inflamed and wept continuously. The caruncle was engaged in the scar tissue. One-fourth of an inch internal to the upper punctum was a fistula communicating with the upper canaliculus. It being impossible to pass the smallest probe into the lacrimal sac, Dr. Boyd had slit the lower canaliculus with a canaliculus knife as far as the obstruction, and had then opened into the sac with a Graefe knife and passed probes into the sac. The epiphora had been diminished to the extent that it was only slightly troublesome indoors. At the extremity of the inner canthus the eye did not quite close and the patient got soap into the eye when washing his face.

Discussion. W. C. Finnoff, Denver, had had a somewhat similar case in a little boy in whom the scar obliterated the canaliculi. With considerable difficulty the canaliculus on one side was located and a style and tubes passed through. With the style in place the boy got drainage, but without the style the edges of the wound collapsed. The style had been kept in place for three months. If the case is seen early, and there is an opportunity to pass a style thru the cut canaliculus, it is then best to use horse-

hair rather than silk to suture the cut ends, since the horsehair produces less capillary attraction.

G. F. Libby, Denver, mentioned a recent conversation with Dr. Theobald of Johns Hopkins hospital, in which Dr. Theobald declared that he still used his probes and lead styles, and with just as much success as when he first originated the treatment many years ago.

F. R. Spencer, Boulder, referred to a recent case in which a man who was injured in a runaway had had the lower canaliculus entirely cut in two by a blow from a weed; and in which if it proved impossible to keep the canaliculus open, Dr. Spencer thought it likely that he might have to resort to Gifford's treatment for obliteration of the lacrimal sac.

Dr. Boyd (closing). My idea of the necessary plastic operation would be to slit the upper canaliculus, open into the sac with a Graefe knife, and insert a canula. I believe the most difficult problem is to get the eyelids to close satisfactorily.

Chronic Dacryocystitis.

E. T. Boyd, Denver, presented a woman aged thirty-one years who for several years had suffered from a chronic dacryocystitis on the right side. In June of this year acute suppurative peridacryocystitis had supervened, and the swelling was lanced over the sac. When the patient consulted Dr. Boyd on July 26 there was a large swelling over the sac, with intense redness, and a free discharge of pus ran down beside the nose from a fistula. It was impossible to pass a probe thru either the canaliculus or the fistula. The canaliculus was slit, a small probe passed, the opening rapidly enlarged, and a lacrimal canula inserted. The inflammatory condition cleared up rapidly, within a week the fistula was healed, and in ten days there was no pus. The patient had been wearing a canula now for nearly four months, she was comfortable, and the condition of the stricture was much improved.

Discussion. D. H. Coover, Denver, remarked that we used to get good results with the use of a canula or style, and he did not see why we should not do so now.

Persistent Pupillary Membrane.

E. T. Boyd, Denver, presented a woman aged sixty years who had come for refraction and had normal vision with correction, but in whose right eye had been found a delicate strand like the thread of a cobweb, extending from 2 to 7 o'clock across the pupil. There were some minute beads of pigment on the thread, and contraction of the pupil caused the thread to relax and buckle.

Discussion. G. F. Libby, Denver, two days after Dr. Boyd showed me this case a woman came into my office with almost the identical condition, except in a slightly different location. The case is apparently one of persistent pupillary membrane. These cases are easily overlooked.

W. C. Finnoff, Denver, had found with the loupe that the thread was derived from the stroma of the iris and not from the posterior pigment of the iris. If it were an inflammatory remains it would be connected with the epithelium rather than with the stroma.

Edward Jackson, Denver. It is hard to trace a fine line like this to its origin when it is attached to the anterior surface of the iris. Being so attached, whatever inflammatory condition the eye has been thru, the thread is likely to be congenital and the remains of the embryonic pupillary membrane.

Simulated Choroidal Neoplasm, Possibly Old Hemorrhage.

H. R. Stilwill, Denver, presented a woman aged fifty years, who had first come to him in March, 1920, complaining of the vision of the left eye having failed for the last two years. The right eye had diverged since childhood until about eighteen months previous to the consultation, but at that time the right eye became straight and the left eye turned out. According to her statement, a year or so before the consultation she had stumbled in the dark, striking the left eyebrow, and there had been more or less pain in this eye since then. The vision of the right eye was 4/20 corrected to 20/20. The vision of the left eye was finger movement to the temporal side only. The tension was normal, and the pupil reacted normally. The ophthalmoscope revealed an elevation begin-

ning one disc diameter to the temporal side of the optic disc, circular in shape, and measuring about three or four disc diameters. The mass was elevated about 2 D., the edges coming up rather abruptly from the surrounding retina. It was traversed by slightly tortuous retinal vessels. The surface was glistening white, without pigment, and irregular in places. Toward the lower and inner part of the mass were two or three red spots resembling minute hemorrhages.

DISCUSSION. D. H. Coover, Denver, said that when he first saw the case he thought the mass might be a sarcoma, but it had shown no development since then and he had given up the idea.

Edward Jackson, Denver. The rather irregular outline is a little against its being a new growth. The history of injury is very clear, and also the statement that the sight of this eye was affected at the time of injury, and especially valuable is the patient's statement that the right eye always turned out until the left eye was injured. I think it must be one of the cases of chorioretinitis proliferans of which many cases were recorded during the late war; commencing with hemorrhage, and finishing with a mass of organized connective tissue.

Extraction of Dislocated Lens.

J. M. SHIELDS, Denver, presented a man aged thirty-three years whose right eye had been struck by a rivet on October 14, 1920. Seen an hour later, there were two extensive abrasions of the cornea, the anterior chamber was deep and filled with blood, there was a radial tear of the iris below, and the lens was dislocated backward. The lens was partly opaque and was supported above by the suspensory ligament. On November 27, Dr. Melville Black attempted extraction thru a section including the upper half of the cornea. The vitreous presented alongside the knife before the section was completed. The lens was removed with a wire loop, the vitreous flowing freely during this performance. No attempt was made to excise the vitreous, but the eye was closed, and the patient kept in bed and as quiet as possible for eight days, during which he made no complaint of pain in the eye. The first dressing, on the eighth day, showed the eye to be almost entirely white and free from photophobia, the corneal flap in position, and the pupil black.

W. H. CRISP,
Secretary.

American Journal of Ophthalmology

Series 3, Vol. 4, No. 3 March, 1921

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

EDWARD JACKSON, Editor,
318 Majestic Bldg., Denver, Colo.

M. URIBE-TRONCOSO,
143 W. 92nd St., New York City.

MEYER WIENER,
Carleton Bldg., St. Louis, Mo.

CLARENCE LOEB, Associate Editor,
25 E. Washington St., Chicago, Ill.

CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.

HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.

Original papers, correspondence, and other scientific communications should be addressed to the Editor. Books for review may be sent to any member of the editorial staff. Reports of society proceedings should be sent to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Ill. News items should be sent to Dr. Melville Black, Metropolitan Bldg., Denver, Colo.

Proof should be corrected, and returned within forty-eight hours to the printers. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned. But reprints to contain colored plates must be ordered when the article is accepted.

Copy of advertisements must be sent to the Manager by the fifteenth of the month preceding its appearance.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to the Manager of Subscriptions and Advertising

JEAN MATTESON, Room 1209, 7 West Madison Street, Chicago, Ill.

ASTHENOPIA.

This word was defined by Mackenzie as "that state of vision in which the eyes are unable to sustain continued exercise upon near objects," without other evidence of disease. Many cases were removed from this class by Donders' observations regarding hyperopia astigmatism and presbyopia. It may now be held to include only those unable to use their eyes for more than a very brief time without pain, altho the eyes are without recognizable ocular conditions to account for this disability. Sufferers from asthenopia in this sense are always something of a puzzle to their medical advisors. There is a tendency to doubt if the suffering so much complained of can be wholly real, and not more or less exaggerated.

It must be borne in mind that we have no common unit for suffering; no objective method of measuring it, except by the evident effects it produces on the sufferer. That different persons suffer very differently, from exactly the same injury or lesion, must be admitted by every observing physician. The same person differs enormously in sensibility to pain, in different physical conditions. A college professor known to his friends as a nervous man, with little stoic endurance of discomfort, when living his routine working life, became a different individuality during his summer vacation. After a few weeks cruising on a sail boat, he suffered a carbuncle involving most of one side of his face. He opened it freely himself, with the knife he carried; and said this was no worse than skinning his knuckles when at home. The extensive facial scars resulting became as much a matter of pride as those of a German college duellist.

We must judge of suffering by the testimony of the sufferer. Altho one is sometimes tempted to indulge in skepticism about it, this is the only evidence we can get on the subject; and to form any rational judgment we must consider such evidence. Judged by such evidence, asthenopia is a morbid condition worthy of our best efforts to relieve. The fixed idea that all such complaints are "hysteric" and must be ignored, is irrational and quite fatal to the usefulness of the physician.

Among the forms of asthenopia that get scant attention and little sympathy, at least in temperate climates and among city dwellers, is that of pain produced in apparently normal eyes by exposure to bright light; altho every one admits that this is to be expected in eyes that are suffering from certain ocular inflammations. We recall a sufferer from such asthenopia in the medical corps of the navy, who for years had been regarded with suspicion by his superiors, and given scant consideration because his eyes exhibited no objective lesions; and he was suspected of simply trying to avoid duty at sea and in the tropics.

Under the name "tropical asthenopia" this disability is given the consideration it deserves by Col. Elliot in his recent book, "Tropical Medicine," noticed elsewhere in this number of the JOURNAL. He brings together the following instance in support of the reality and seriousness of the affliction. "A young English planter in the East travelled many miles to consult a surgeon. A 'careful examination' of his fundus was made, and he was assured that there was 'nothing the matter with his eyes.' Some idea of the despair into which the loss of his last hope plunged him, may be gathered from the fact that he returned to his estate and drowned himself. The medical man, whose 'careful examination' had probably increased his patient's suffering, was disposed to consider the patient's symptoms unreal, until he heard of the melancholy ending of the case. It was only then that he realized that possibly he had made a mistake—an opinion in which there was little difficulty in confirming him.

"A gentleman who had served a long time in India complained that, in his worst attack, which, by the way, was cured by leave to Europe, he was so bad that, when he was on his journey home, the 'sight of a white face was enough to pain him.'

"A medical man who suffered from glare, stated that on one occasion when he went home much run down in health, it was painful for him to write on white paper.

"An elderly gentleman in the Civil Service only began to experience any trouble in the last four years of an exceptionally busy and active official life in India; his servant had orders to enter his room before daylight, to close every door and window, as otherwise the light was apt to upset him for the day.

"An ophthalmic surgeon in large practice suffered so severely from his eyes that he had to devote Sundays to lying in a darkened room, in order to rest himself sufficiently for the work of the coming week. He was only able to carry on by the determination 'to stick it' at all costs.

"A missionary who had landed in India full of enthusiasm, was seen in a condition bordering on insanity; he said that life was one long misery; even in the dark room the least ray of light annoyed him. An Ichabod had been written across his once ardent missionary zeal, and his one desire was to obtain a medical certificate that would enable him to escape from 'this hateful glare.'"

The importance of asthenopia has frequently been forced upon the writer by the extreme cases that occur among patients suffering from pulmonary tuberculosis, involving lesions of considerable extent, but generally with rather good systemic resistance. Such patients sometimes have marked errors of refraction and sometimes very slight ones, but no evidence of ocular disease. In either case they complain of very slight inaccuracy in their correcting glasses, and appreciate some diminution of suffering from slight rectification of their lenses. But they never get anything like complete relief from their pain and disability, and under the best possible conditions cannot use their eyes anything like as much as they wish. With recovery from the tuberculosis, they become free from asthenopia, and may discard glasses on which they were before entirely dependent.

All who make a practice of carefully correcting errors of refraction find a certain number of patients whose suffering is not relieved by lenses. Atten-

tion to muscular imbalance relieves some others, but some remain who are no more helped by that. A few minutes use of the eyes provokes the pain; from which they have vainly sought relief from various physicians, and from various current systems of medical quackery.

Pain is "the tongue of disease" in which effective protest is made against some overstepping of the limits of endurance, by departures from the conditions of healthy living. It only becomes effective after a long period of struggle against some adverse influence, and depends but little on the temporary condition that seems to give rise to it. The tropical asthenopia does not arise from seeing a white face, or ten minutes' exposure to the morning sun; but from the ten years' unnoticed struggle, against what was for that particular organism an adverse influence of vital importance. This may have been excessive light; but it may also have been excessive heat, and other altered conditions of living that finally produce a form of asthenia that leads the body to react by pain, to what was once a normal stimulus.

Much the same is true of the consumptive. The long saturation of his nervous system by the toxins of the tubercle bacillus, while stimulating it to a reaction needed to combat the invasion that threatens the body's destruction, has also come to limit by pain the demands made by even the slight mental and physical effort of reading. Presumably, this is in the interest of the conservation of nerve force, or the equalization of the circulation demanded in combatting the bacillary invader. Unquestionably other persistent infections lead to a similar result as in the headaches of chronic appendicitis.

Careful analysis must be made of the life of the asthenope, who is found in the residue of patients unrelieved by lenses, prisms or exercises. This analysis, differing from the psycho-analysis of Freud, so effective in some cases of "hysteria," but which might be compared with psycho-analysis, will sometimes show us the deep-lying unobtrusive, but long acting causes of his asthenopia, in the patient's previous life.

These patients are generally adults, often nearing middle life, or older, whose habits of nerve action and reaction have long been formed and are well established. Any rehabilitation to be effective must be founded on investigation and inference, going deep and extending far back, and on changes in the habits of using the eyes, or rather the portion of the central nervous system exercised by use of the eyes, which must be persistently insisted on until new habits and reactions are established, at a period of life when they develop very slowly.

A good intellectual appreciation of the essential basis of asthenopia, and the difficulties of removing it, should be followed by a frank discussion of the situation with the patient. These patients have generally been disappointed so often that they are not much disturbed by the lack of any promise of quick and easy relief; and nothing but the patient's intelligent, persistent cooperation, in living and working along the lines indicated for his or her particular case can ever effect a cure. E. J.

SIZE OF OCULAR FUNDUS DETAILS.

With the ophthalmoscope the parts seen appear magnified, the apparent enlargement increasing from the cornea to the deepest part visible. The extent and importance of this magnification is impressed on one by studying some choroidal or retinal lesion with the ophthalmoscope, and then looking at it after enucleating and cutting open the eye. A piece of steel, seen with the ophthalmoscope suspended in the vitreous, seemed so small when extracted on the tip of the magnet that it was at first quite overlooked in a little clot of blood.

The amount of this enlargement is such that it may easily cause confusion when the same unit of size is used to indicate dimensions, both actual and apparent. Thus a spot has been spoken

of as so many millimeters in diameter, when not its real size was meant, but the size it appeared to that observer when looking at it thru the ophthalmoscope. Such statements are likely to be misunderstood and utterly misleading.

It is even confusing to think of millimeters varying so greatly in apparent size, when the actual size of the lesion has been designated and understood. The millimeter of the retinal lesion looks ten or fifteen times as large as the millimeter of the lesion in the iris or cornea. Whatever method of indicating size is used for distances and spaces within the eye, it should show in itself, or should be accompanied by a statement showing whether real or apparent size is meant.

There are two distinct purposes for which designations of size may be required: (1) To indicate the position of a point or lesion in the fundus, so that it can readily be discovered again; or its size to determine if it is increasing or diminishing so that observations made at one date can be compared with those made on the same eye at a later date. This is the most practical and general need in following a case from time to time. (2) The making of a record that can be embodied in a case report, to indicate the size or position of a lesion, in general units of size or position, that can be used in comparing that case with others and by persons who will never see it.

For both purposes, the landmarks of the ocular fundus itself furnish most convenient units. The optic disc, particularly its diameter, (the disc diameter or d. d.) is a most striking and convenient unit for indicating large dimensions or large distances in the fundus. It is fairly constant both in actual and relative size. Any deductions as to actual size, as in millimeters, must usually be based on the diameter of the disc, assumed to be 1.5 mm. For much smaller dimensions the diameters of the retinal vessels furnish a graded scale. For reexamination of that particular eye, it may be made definite by mentioning a particular vessel; as "diameter of upper temporal artery at edge of disc," or "double the diameter of the neighboring vein."

The size of the disc remains constant thruout adult life, that of a vessel may vary somewhat; and we cannot lay the scale directly on the thing measured. Still having these units of size directly before the eye to compare with the condition, the size of which is being considered, they have great practical value. The habit of comparing each appearance noted with such a unit increases the exactness of all one's observations.

For recording the part of the fundus in which a certain lesion is seen, the retinal vessels furnish an excellent method. It is easy to note the relation to a particular artery or vein, or to some special branch; as, "the second temporal branch of the upper temporal artery." Or in disc diameters, one may record its distance from the edge of the disc. At the extreme periphery of the fundus, or at the optic disc the clock dial method of notation may be used.

These are not so exact as the plan of fixing the location subjectively, by taking the field of vision and mapping it on a chart, like that suggested by Cowan in the January number (p. 28). But the latter method only applies when the appearance in question causes an interruption of the field of vision; and does not take account of variations in color and appearance before vision has been interfered with, or after it has been lost. The objective and subjective methods supplement one another.

The objective method of projecting the lines of a scale on the fundus, where they can be applied directly to the part to be measured or mapped, is practical with one of the larger fixed or demonstration ophthalmoscopes. But it is scarcely available for the ordinary ophthalmoscopic examination. Even with such a scale, the absolute value of its divisions must vary with the refraction of the eye. So for purposes of an absolute record the accuracy attained is not much greater than by methods more generally applicable.

The important practical points are:

To form some estimate of the size and location of each lesion or peculiarity of the ocular fundus, in units of the fundus itself—the disc diameter or breadth of the retinal vessels. Then the observation should be noted on the case record in unmistakeable terms, preferably of the units above mentioned, in which the sizes have been observed. E. J.

BOOK NOTICES.

Tropical Ophthalmology. Robt. Henry Elliot, M.D., Sc.D. (Edin.) F.R.C.S. England. Lt.-Col. I.M.S. (Retired), Late Supt. Government Ophthalmic Hospital, Madras, etc. 550 pages, 7 plates, 117 illustrations. London, Henry Frowde, and Hodder and Stoughton.

Reading the title of this work for the first time, one naturally asks, what is "tropical ophthalmology?" Briefly, it is ophthalmology and matters closely related to it, as these are presented to one engaged in ophthalmic practice in a tropical country. For his material, the author has drawn largely on his own experience in India. But he has also had the assistance of numerous colleagues in that field of practice, and has used freely the records, now rapidly accumulating, regarding ophthalmic practice in many other tropical countries of the world.

The reader already familiar with the practice and literature of ophthalmology will find here much already known to him. But it is discussed from a viewpoint and in relations essentially new, which add to this statement of it new value and interest. We know of no book on ophthalmology recently published in which the ophthalmologist of the western temperate zone will find so much of interest and profitable entertainment. It is an account of ophthalmic practice not only in the tropics and in the Far East, but among different races and often under very primitive conditions.

The work is divided into ten sections from the headings of which one may gather a list of the classes of facts that give novelty and interest to these pages. First we come to the effects of exposure of the eyes to strong light, and then to the wind and dust of tropical countries. The injuries inflicted on the eye by animals include those caused by flying insects, chemical injuries by other animals, injuries by stings and bites and the invasion of the lids and eyes by small arthropods. The sections on parasitic diseases of the eye, divided into four parts, includes 15 short chapters devoted to different classes of such parasites.

The Indian Operation of Couching for Cataract is the subject of one section; and the next is devoted to Cataract Extraction. In the chapter on methods of operating the author says, "There are two distinct methods of operating for cataract—(a) By delivery of the lens entire in its capsule—the so-called Intra-capsular Operation; and (b) by opening the capsule, and leaving it or the main bulk of it behind, while the lens substance is expressed—the Capsule-Laceration Operation." After stating the claims made for each method, this advice is given: "The author has no wish to prejudice the young surgeon in either direction, but since his object is to make this chapter as practical as possible, he would confine himself to saying that, in his experience, and he has tried both methods freely, the capsule-laceration operation is both easier and safer than the other. It is, therefore, to his mind the obvious method for beginners. He would most strongly advise all those who can do so, to visit the men whose cataract opportunities are large, to see their work at first hand, and then to decide which method they will adopt, or whether they will use both according to rules which experience leads them to formulate for themselves."

Lt. Col. Kirkpatrick, the present superintendent of the Government Hospital there, has written the chapter on "The Madras Cataract Operation." This operation is peculiar in that the capsule is always lacerated with a needle before making the corneal section. This procedure gives evidence regarding the size of the nucleus and its consistence, which may be helpful in planning the size of the corneal incision. Then for the removal of cortex and the toilet of the wound reliance is

placed largely on irrigation of the eye; usually without introducing the nozzle of the irrigator within the wound. Some warnings and rules based on Col. Elliot's large experience in teaching beginners, and his observation "that practically every man who has not had large practice makes identically the same mistakes," are full of great practical wisdom.

There are over 50 pages devoted to diseases of the conjunctiva, cornea, lids and lacrimal passages, giving light new to most of us, even on trachoma and lacrimal obstruction. Then comes a section headed "Miscellaneous" in which the author makes brief mention of glaucoma, saying nothing of methods of operative treatment, except a good description of optico-ciliary neurectomy for blind painful eyes. This operation the native Indians greatly prefer to the enucleation that would be practiced in Western Europe or America.

In the same section we find some very interesting statements of statistics given by Lt.-Col. Kirkpatrick in an account of ophthalmoscopic appearances in the tropics. "Careful notes on over 500 cases of fundus disease, taken at the Madras Ophthalmic Hospital, show a rate of over 60 per cent of venereal disease, and in all probability the infection is even higher than this."

Ocular sepsis, chiefly pyorrhea, was found in over 47 per cent of fundus disease cases. Consanguinity of parentage exists in about 60 per cent of the general community, and in 71 per cent of the fundus cases. "Optic atrophy represents 32 per cent of all fundus disease, and retinitis pigmentosa nearly 12 per cent." The latter constitutes 21 per cent of all diseases of the choroid and retina; and among these cases, 87 per cent furnished a history of consanguinity.

Sun blindness has especial importance and interest in India, because "it is part of the Brahmin ritual to look at the sun whilst reciting a particular 'mantram' during the midday prayer." The account of sun blindness given in the second section of the book is in many respects the best that has yet found its way into any text book of ophthalmology.

The final section on General Diseases includes, in about 100 pages, the ophthalmic aspects of such affections as Beri Beri (written with the help of Professor Miyashita of Osaka, Japan), Cholera, Dysentery, Leprosy, Malaria, Quinin Poisoning, Pellagra, Plague, Smallpox, Trypanosomiasis, Yaws (written by Dr. Louis Sambon) and nine other diseases.

The value of this book for the student, and as a work of reference, is greatly enhanced by references to the literature, given with the account of each subject at the end of each chapter; the full but not overloaded index of subjects; and the index of names of authors cited, including many from the literature of the last three years. It is written thruout in the clear easy English of which its author is a master. We welcome it to the standard literature of ophthalmology. E. J.

Cure of Imperfect Sight by Treatment without Glasses. By **W. H. Bates,** M.D. 313 pages. 55 illustrations. New York. Central Fixation Publishing Company, New York City.

The purpose and character of this book can best be stated in the author's own words. In front of the title page and frontispiece, is a page stating:

"The Fundamental Principle.

"Do you read imperfectly? Can you observe then that when you look at the first word, or the first letter, of a sentence you do not see best where you are looking; that you see other words, or other letters, just as well as or better than the one you were looking at? Do you observe also that the harder you try to see the worse you see?

"Now close your eyes and rest them, remembering some color, like black or white, that you can remember perfectly. Keep them closed until they feel rested, or until the feeling of strain has been completely relieved. Now open them and look at the first word or letter of a sentence for a fraction of a second. If you have been able to relax, partially or completely, you will have a flash of improved or clear

vision, and the area seen best will be smaller."

In the preface, the author states that he "aims to give a collection of facts and of theories." But he makes no distinction between an established theory and an unsupported hypothesis. "The explanations of the phenomena of sight put forward by Young, von Graefe, Helmholtz and Donders have caused us to ignore or explain away a multitude of facts, which otherwise would have led to the discovery of the truth about errors of refraction and the consequent prevention of an incalculable amount of human misery." Dr. Bates speaks of his book as, "presenting my experimental work to the public," and says, "As there has been a considerable demand for the book from the laity, an effort has been made to present the subject in such way as to be intelligible to persons unfamiliar with ophthalmology."

The things stated as facts include a curious medley. Cases of unexplained apparent accommodation after extraction of the lens are cited as proving that the current views regarding accommodation are all wrong; sweeping aside the many facts of common observation upon which they have been established. Showing that the curvature of the cornea and the length of the eyeball can be changed by external pressure or muscular action, it is assumed that this is the usual way in which ocular refraction is modified.

In the chapter headed "Simultaneous Retinoscopy," we are told "The test card and trial lenses can be used only under certain favorable conditions, but the retinoscope can be used anywhere. It is a little easier to use it in a dim light than in a bright one, but it may be used in any light, even with the strong light of the sun shining directly into the eye. It may also be used under many other unfavorable conditions."

"It takes a considerable time, varying from minutes to hours, to measure the refraction with the Snellen test card and trial lenses. With the retinoscope, however, it can be determined in a fraction of a second. By the former method it would be impossible, for instance, to get any information about the refraction of a baseball player at the moment he swings for the ball, at the moment he strikes it, and at the moment after he strikes it. But with the retinoscope it is quite easy to determine whether his vision is normal, or whether he is myopic, hypermetropic, or astigmatic, when he does these things; and if any errors of refraction are noted, one can guess their degree pretty accurately by the rapidity of the movement of the shadow."

Each of our readers, who knows something of the shadow test, can decide for himself whether the above is a statement of fact or of fancy. If he feels interested to go further, he will find in this book many other statements quite as striking, and quite as opposed to his ordinary experience.

It is curious to see how ordinary facts can be looked at in such a way as to lose their usual relations and significance, taking on many of the characteristics found in the observations in "Alice Through the Looking-glass," and the teachings of "Science and Health."

E. J.

CORRESPONDENCE.

Cataract Extraction.

To The Editor: In the Ohio State Medical Journal for August, 1920, Dr. D. T. Vail criticizes the operation of cataract extraction as usually performed, that is with capsulotomy and expression of the lens, leaving part of the capsule behind, "because it is only applicable to ripe or nearly ripe cataracts. The capsule on a live lens adheres to the cortex, and when left within the eye, frequently causes dense after-cataract, which is far worse than the original cataract." Since this opinion, altho so positively stated, and coming from one of unusual skill and experience, is not the opinion of all other operators and observers, it seems to me that it should not be permitted to go unchallenged.

The capsulotomy operation is not "applicable only to ripe or nearly ripe cataracts." Twenty or more years ago, Weeks called attention to the ease with which even clear lenses could be extracted in persons of advanced age, since the lens is well sclerosed, regardless of

its transparency or lack of transparency. This observation was made on the cadaver, and subsequently confirmed on the living, and the opinion was then given that the extraction of unripe cataracts by the ordinary operation was a safe and justifiable procedure. I can confirm this from a considerable experience, and could recite many cases in which the lens was successfully extracted altho far from completely opaque, and often when the fundus of the eye was still visible with the ophthalmoscope.

Dr. Vail further states that "the best time to operate is before senility and blindness have set in," and with this I heartily agree. He also says that "my experience in the newer technique has taught me to believe that it is reprehensible to allow the patient to go blind from cataract before operating." So has mine, except as to the "newer technique," by which he means the Smith Indian operation. Those of moderate experience, in which category I place myself, have hesitated to undertake the Indian operation. It seems to be a formidable procedure, and upon one occasion when I had the pleasure of seeing Dr. Vail himself operate, difficulties arose which taxed even his resources, and would have been disastrous to an operator less experienced.

With reference to the adhesion of the capsule to a "live" lens, the author refers to the "removal of the anterior capsule from the eye in the case of immature, mature or hypermature cataract" by his capsule forceps, as a "distinct advantage over leaving it within the eye," so that it is not impossible to remove it, and when this is done, one is not doing the Indian operation. It is admittedly more adherent to unripe than to ripe cataracts, and also it admittedly causes after cataract when it is left, in many instances. But others will certainly not agree that this after cataract is "far worse than the original cataract." The vast majority of after cataracts can be successfully and safely disposed of by a simple, brief and painless procedure, with confinement for not more than 24 hours. I do not mean to say that all are so simple, but the vast majority are.

That Dr. Vail's results with the Indian operation are excellent, no one doubts, but the results obtained by other operators by other methods will compare favorably with the results of the Indian operation in every particular. Speaking for myself, the objections and difficulties which he urges against the operation as done by the large majority of operators, in this country at least, do not exist.

I agree with Dr. Vail that a patient with a cataract in his only eye or in both eyes, should be operated on at an early period, as soon as he has an embarrassing failure of vision; and the operation can be safely done by any one competent to do cataract operations at all if the following points are observed.

(1) Complete anesthesia. Local anesthesia is nearly always sufficient, and should be obtained by repeated instillation of the anesthetic, supplemented at the last with a drop of adrenalin. If an iridectomy is contemplated, or if the patient is sensitive, the subconjunctival injection of the anesthetic is very helpful.

(2) Quiet in the operating room. Many an otherwise docile patient has been upset to the point of losing his self-control by irrelevant talking in his presence, unnecessary noise of all sorts, needless delays, etc. A little assuring talk from the surgeon is a great help, and after that no one should address the patient but the operator.

(3) The patient should be told how to relax, and made to do so. The best single means to that end is to make him open the other eye. This is a very essential matter in my experience, yet its value is not appreciated in many clinics that I have had the pleasure of visiting.

(4) A large corneal incision is essential. The position of the incision is not now under discussion, but is should be ample in size.

(5) A free capsulotomy. I agree with Dr. Vail as to the great advantage of the capsule forceps for this purpose. My personal preference is for the Kalt forceps; and with this instrument the zonule will often rupture and the lens will be delivered in the capsule, as advocated by Stanculeanu and Arnold Knapp. If the capsule tears, a generous piece is usually removed, facilitating the delivery of the lens. I prefer that this should happen, as the exposure of the vitreous, which happens when the lens is delivered in the capsule, has seemed to me to result in a

greater proportion of vitreous opacities and consequent disturbance of vision. This may not be the experience of others.

(6) A careful toilet of the wound. Nothing so contributes to excessive reaction as the retention of portions of cortical matter in the eye, and nothing so well repays one for the time spent as a proper toilet of the anterior chamber. The method of irrigation by washing past the wound with a pipette has seemed to me to be entirely futile, while the introduction of a slender irrigating tip into the pupillary space is much more effective. Best of all seems to be the "suction curette." This procedure can be safely and effectively carried out if a corneal suture is used, but I did not write this letter to advocate the use of the corneal suture.

Another reason for advocating early operation is to put a stop to that pitiful procession of the hopelessly blind who come to the offices of eye surgeons after they have followed someone's advice to wait "till their cataract is ripe" before seeking relief. If they can be taught that this wait is not necessary, but that they can be relieved at a much earlier period than that of total blindness, many, many eyes would be saved from glaucoma by being brought under observation at a time when something could be done for them. Yours very truly,

E. C. ELLETT.

Memphis, Tenn.

The Stereoscopic Appearance of Certain Pictures.

To the Editor:

Dr. F. W. Edridge-Green writes under the above title in "Nature," November 18, 1920, p. 375:

"In a demonstration, which I gave before the Physiological Society (Journal of Physiology, Vol. 48, 1914), I showed that the perception of binocular relief is independent of double images of the two retinae similar to those which are presented by an object in the field of vision. This can be shown by taking a pair of stereoscopic photographs in which the point of sight is at the center of each and cutting them vertically in two, and then, having pasted the left half of the left photograph on the left side and the right half of the right photograph on the right side on white or black cardboard at an appropriate distance, so that there is no overlapping when placed in the stereoscope, a picture in striking relief is obtained when combined together in the stereoscope. In this case it will be noticed that there is no portion common to both fields of view. In each case the overlapping portion is combined with white. It seems probable that this is how binocular vision takes place in ordinary circumstances. If an object in high relief—as f. i. vase or the face of a person—be viewed at a short distance and one particular point fixated, it will be noticed that the right eye dominates the right side of the field of vision and the left eye the left side, as may be proved by noticing the relation of surrounding objects, and closing first one eye and then the other alternately."

As it seems from referring to the publication in 1914 this viewpoint has not been contradicted in the English literature: nor have I seen a reference to it in any subsequent numbers of "Nature." Even now the above statement seems to pass unnoticed. Shall this opinion, which reverses all our notions of Binocular Single Vision be accepted unchallenged? It is remarkable how an ophthalmologist can conceive such an absurdity. It seems to me, however, that the same can be traced to a misunderstanding of what happens when we see thru a stereoscope.

"Stereoscopic vision," or the visual impression received by seeing with a stereoscope, is not the same as "perception of depth." Stereoscopic vision is an "abnormal binocular vision." We see thru a pair of positive lenses, which are combined with adducting prisms. The positive lenses replace the lenticular accommodation, so that a clear perception can take place at the focal distance of these lenses (usually at about 20 centimeters). The adducting prisms help in bringing the visual axes in a parallel position.

As not everybody has learned to make his accommodation independent from his convergence, it often takes a certain amount of time before appreciating the stereoscopic effect of a picture. When we look for stereoscopic effect at a picture the following happens: Trying to

bring our visual axes in parallelism the two images seen with the right eye are projected to the left and the two seen with the left eye are projected to the right. We first see four pictures. If stereoscopy takes place the right image of the right eye will come together with the left image of the left eye, so that only three images are seen, the middle of which shows the stereoscopic effect. This happens for the "free" stereoscopy. Using the instrument we only notice the middle picture, as the partition between the lenses which projects forward excludes for each eye the outward picture.

If we now repeat Dr. Edridge-Green's experiment we do not need to cut a stereoscopic picture in two and paste each part—as he describes—on another piece of paper, but we can simply cover the middle part of the photo with a piece of paper. Such a stereoscopic picture put in the instrument will undoubtedly show a stereoscopic effect, *but this is the result of the pictorial arrangement,* and goes to show that we can get stereoscopic effects even without fusion of two nearly similar impressions. We know from daily life how important the secondary impressions are, as e. g., the perspective representation, the shading, etc.

Dr. Edridge-Green can never prove his position with pictures, which demand Synthesis—and these are the only valuable ones for proving the stereoscopic impression. Everyone can convince himself of this. Take Javal's well-known drawing of the two unequal arrows, appearing among other publications in Helmholtz' Memorial, which produces the impression of being turned at right angles, or the type of pictures, of which Würdemann published an example in the A. J. O., 1914, and which is exemplified in the Stereoscopic Test Chart of Bausch and Lomb.

If, in these cases, the inner halves of the stereoscopic charts are obliterated, either by cutting out or covering, one *can not get* stereoscopic effects.

The above can be easily verified. Any opinion, therefore, which questions the fact that the right visual field partly covers the left one and that this produces in the brain the fusion of these impressions, which becomes exteriorised as "the perception of depth" is, I repeat, an absurdity.

If Dr. Edridge-Green's opinion were correct, there would not be any difference between "Simultaneous Vision" and the socalled "Stereoscopic Vision."

See also the writer's article, "Binocular Single Vision," in the Transactions of the Section of Ophthalmology of the A. M. A., 1917.

Dr. E. E. Blaauw,
Buffalo, N. Y.

BIOGRAPHIC SKETCHES.

Thomas H. Shastid, M.D.,
Superior, Wisconsin.

Campbell, John Franklin, of Chicago, was born in Ontario, Canada, on Yonge St., north of the city of Toronto, Jan. 17, 1864; being a son of John and Carolyn Clay Campbell, and the eldest of seven children. Having attended the public schools of Toronto, he taught therein for about three years. His medical degree was received at Toronto University. After three years' practice in Toronto, he went to Scotland, where he pursued a course of graduate study in medicine for about a year, and became a licentiate of the Royal College of Edinburgh and Glasgow. Removing to Chicago, he practiced there until his death. On August 12, 1908, he married Miss Inez Olds. There were no children. In his later years Dr. Campbell confined his attention to diseases of the eye, ear, nose and throat.

Dr. Campbell was a man of strong character and lofty ideals. He was an active church worker of the Presbyterian Church. An intimate friend writes, "He held the Christian faith to be the supreme principle of human life."

Dr. Campbell died July 14, 1920. Masonic funeral services were held on the following day, America Lodge officiating. The interment was at Toronto, Canada.

Moore, Fontaine Bruce. Born at Helena, Ark., April 6, 1886, son of Dr. Frierson and Annie Laurie, Moore, he received his medical degree at the University of Pennsylvania in 1911. He practiced as a specialist on the eye, ear,

nose and throat at Memphis, Tenn. He was a member of the Memphis Society of Ophthalmology and Oto-Laryngology, a Fellow of the American Academy of Ophthalmology and Oto-Laryngology, Lieutenant, M. C., U. S. A. (discharged Dec. 27, 1918) and Clinical Assistant in Otology at the Medical Department of the University of Tennessee. He married Miss Florence Shelton. Dr. Moore was of medium height, stout, of dark complexion, quick and active in manner, very cordial and friendly; a collector of books, stamps and coins. He died Nov. 27, 1920, of lobar pneumonia.

MORGAN, JOHN. Born in 1845, he received his medical degree in 1869 at Yale University. He practiced at Springfield, Mass., at Boston, Mass. (for 22 years) and, for the last few years of his life, at New York City. He died of heart disease at Hadlyme, Conn., Aug. 30, 1920.

Concerning the personal characteristics of Dr. Morgan, we append the following from Philip Hale:

"It was not easy to obtain from him a bill for the service rendered, whether it was an operation for cataract, or merely a prescription for spectacles; and when a bill was finally extracted from him, it was always modest, sometimes ridiculously so. Brusque in manner, he was the personification of kindness. In the report of his death it was stated that 'one of his whims was to pick out newsboys and street urchins who had eye ailments and give them free treatment.' This was not a passing 'whim.' During his years in Boston, he gave many professional men, who were constantly using their eyes, sometimes abusing them, free treatment, in spite of their protest."

NUNN, RICHARD. An Irish-American ophthalmologist and oto-laryngologist, professor of diseases of the eye, ear, nose and throat in the University of Oregon Medical School, a son of J. Wesley Nunn, County Wexford, Ireland, born about 1859. His medical degree was received at the University of Dublin, in 1883. Dr. Nunn's life would seem to have been a succession of tragedies. Made heir to his father's estate, he became, for some reason, unable to enjoy its emoluments. He therefore removed to America, and, though nominally the heir of a very fine Irish estate, had little property or cash. About 1900 he married Emilie Trevett , by whom he had several children. Of these the eldest and the youngest were drowned—a loss from which the Doctor seems never to have recovered. In May, 1915, he went to England and joined the Royal Army Medical Corps. Passing over to France, he was found unable to endure the physical hardships, and was invalided back to England—an occurrence which broke his heart, for he was never again the same person either in body or in mind. Twelve months after the armistice was signed, he was mustered out, and returned to America.

Afflicted with insomnia, he resorted to opiates, and died of an overdose, August 17, 1920.

In his younger days, Dr. Nunn was a well known rower, having been on the London Rowing Club eight. He was large, lean, mustached, with ruddy complexion, gray eyes and brown hair.

ABSTRACTS

Goerlitz, M. Blindness after Extreme Loss of Blood. Klin. M. f. Augenh. v. 64, 1920, p. 763. (ill.)

Goerlitz relates the clinical history of a man, aged 57, who ten days after a severe hemorrhage from a duodenal ulcer became totally blind, and died several days later. The optic discs were opaque and edematous without definable borders from, in a large extent, the whitish, opaque, edematous retina. The vessels were scarcely visible on the disc, in general very thin and pale, no venous stasis, two slight hemorrhages. Five days later, the pupil very immovable to light. The opacity of the discs had decreased, so that the border could be discerned. The color

had in general become more white, vessels better filled. From the start both eyes sunken in the orbits, conjunctiva completely anemic.

The microscopic examination revealed in both eyes an intense edema of the disc extending into the layer of nerve fibres, and between these, were peculiar nodules, projecting on the surface. They consisted of accumulations of polymorphous, partly nucleated, formations, terminating in a pointed process. Immediately at and behind the lamina cribrosa were circumscribed foci of degeneration, in which the medullary sheaths were destroyed. Their position and configuration reminded Goerlitz very much of the foci of degeneration in multiple sclerosis. Probably, they are caused by the edema of the optic nerve and its surrounding fibres, due to changes of the vascular walls, possibly thrombotic processes.

For treatment, Goerlitz suggests the transfusion of blood. C. Z.

Haab, O. E. Iron Splinters Removed from Interior of the Eye. Archiv für Augenheilkunde Bd. 84, 1918.

The son of Prof. Haab is following in his father's footsteps, being given an opportunity for observation of penetrating injuries of the eye by iron particles that is unique. The peasants of Switzerland till their stony ground largely with a mattock, a species of heavy hoe, which, being made of rather crude steel, is daily chipped in the progress of their work and thus the larger number of this character of foreign bodies seen in Switzerland comes from the use of this implement. "Bowed with the weight of centuries he stands," and is often blinded by this crude method of tilling the ground.

Our literature does not note anything special about the form, the weight, or the character of metal splinters. The elder and the younger Haab have removed 370 such splinters in the course of the last 35 years, mostly by the giant magnet, and 243 of these were saved for specimens. It was found that when the foreign body had been in the eye only a few days, its color and shape were changed by rust. This depends upon its degree of hardness, the softer metals rusting more quickly.

The origin of the specimens could usually be denominated from their color, size and shape. The hoes and mattocks used in Switzerland are very wide and heavy. The edge is not very sharp and hence chips broken off are of irregular shape and fairly large, in contrast to those from hatchets, hammers, chisels and other tools which have sharper cutting edges and are of better steel. From these the foreign bodies are usually smaller, bright and of quite irregular shape, being mostly rhomboidal, about two or three times as long as they are wide or thick. The splinters are deformed and usually do not fit well in the hole of the tool from which they came. They are usually larger on account of the change in their shape, softer metal objects being more deformed than those from hard steel.

Of the matrix the Haabs were able to secure but two out of the many hoes and mattocks which had caused these injuries. Of the other tools they generally tried to secure the offending tool to note its composition. It is practically always a splinter from the tool that causes the injury, rather than that of another piece of metal upon which the tool was used.

The splinters which had penetrated the eye varied in weight from 0.001 to 0.10 grams, 40% of them weighing from 0.001 to 0.005. The author gives numerous diagramatic illustrations of objects, showing the methods of production of these splinters, the direction of the force, the sizes and shapes, with tables and diagrams. Of much interest is a photograph of a large number of these foreign bodies from the interior of the eye, which have been removed by the magnet.

H. V. W.

Baldino, S. A New Apparatus for the Determination of Heterophoria. Arch. di Ottal., v. 27, 1920, p. 57.

The author's apparatus is based on the "Hole in the Hand" experiment. It is somewhat similar in its use of

this idea to the device proposed by Cantonnet. It consists in two tubes 20 cm. long, resting on a horizontal bar, which is supported on a tripod. Both tubes are movable in any direction, and can be twisted on their long axis, each movement being recorded on a scale reading in prism angles. The distance between the tubes is adjustable from 40 to 70 mm.

In making the test for infinite distance, the tube of the fixing eye is left open, the other tube contains an opaque disc with a small hole prolonged into a slit above and below. The observer, fixing any distant object through the open tube, is asked to superpose the small hole on this object by moving the tube containing it, the amount of movement laterally or vertically registering his heterophoria.

If the slit appears slanted he is to turn the tube till it is vertical, registering his cyclophoria. For any given distance, the heterophoria is calculated by means of a table based on the orthophoric subject at the various distances.

The chief advantages claimed for this over Cantonnet's apparatus and other devices are:

1. It determines all forms of heterophoria directly in prism angles.
2. Serves for distant and near tests.
3. Measures cyclophoria.
4. Aids in examining the muscle-balance in the upper, lower, and lateral fields.
5. Has an adjustable base line.

S. G.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are nedeed in other localities.

DEATHS.

Sir W. de W. Abney, writer on color vision, died in London December 3, at the age of 76.

Thomas W. Delany, of Dublin, Hon. Secretary of the Irish Ophthalmological Society, died Oct. 10, 1920.

John E. Harper, Emeritus Professor of Diseases of the Eye in the College of Physicians and Surgeons, Chicago, died from myocarditis, January 8, 1921, aged 69.

Dr. A. von Szily, Professor of Ophthalmology at Budapest, author of numerous papers on ophthalmology, father of Dr. Aurel von Szily, died November 20, 1920, at the age of 73.

PERSONALS.

Dr. George E. Bellows, ophthalmologist in Kansas City, was elected president of the Jackson County Medical Society for 1921.

Dr. L. Webster Fox, Philadelphia, will spend three weeks on a holiday trip, fishing in Florida.

Dr. George E. de Schweinitz, Philadelphia, returned on Tuesday, January 4, from a holiday trip to Bermuda.

Dr. Melville Black, Denver, has recovered from an operation for appendicitis, and is spending a two months' vacation in Honolulu.

William Hislop Manson has been appointed to the Chair of Ophthalmic Medicine and Surgery in the Anderson College, Glasgow.

Dr. J. Gonin has been appointed Professor of Clinical Ophthalmology in the University of Lausanne in succession to the late Professor.

Dr. G. Oram Ring will leave Philadelphia the latter part of January to join friends on a houseboat at Fort Meyers, Florida, for a fishing trip.

The Middlemore Prize has been awarded to Harry Moss Traquair for his essay on perimetry, its methods and its value to the ophthalmic surgeon.

Dr. A. Noceti, Professor of Ophthalmology at the University of Buenos Aires, has resigned his chair on account of lack of time for its duties.

Dr. A. H. H. Sinclair has been appointed an ophthalmic surgeon and Dr. E. H. Cam-

eron an assistant ophthalmic surgeon to the Edinburgh Royal Infirmary.

Dr. Clarence Loeb, of Chicago, conducted a Clinic Hour and gave a special address before the December meeting of the Milwaukee Oto-Ophthalmic Society.

Dr. L. S. Bressler, formerly of Brooklyn, N. Y., has moved to Chicago, where he has opened an office at 6255 South Ashland Ave., to continue the treatment of eye, ear, nose and throat diseases.

Dr. Thomas Dowling wishes to announce that he is now associated with the Mason-Blackford-Dowling Clinic of Seattle, Washington, in the practice of ophthalmology, rhinology and oto-laryngology.

At a meeting held on October 20, Dr. George MacKay was reelected President of the Royal College of Surgeons of Edinburgh. Dr. Freeland Fergus has been reelected President of the Royal Faculty of Physicians and Surgeons of Glasgow. Mr. R. H. Dickson, of Newcastle, Staffs., has been elected President of the North Staffordshire Medical Society.

In celebration of his eighty-fourth birthday, Dr. W. W. Keen, surgeon emeritus of Jefferson Medical College of Philadelphia, was tendered a dinner and reception at the Bellevue-Stratford, Philadelphia, on the evening of Thursday, January 20. Dr. George E. de Schweinitz was toastmaster. Addresses were made by Rev. Dr. Faunce, President of Brown University; Hon. David Jayne Hill; Dr. William H. Welch, of Johns Hopkins University; Dr. J. C. DaCosta, professor of surgery at Jefferson Medical College; the Hon. Elihu Root. The Philadelphia ophthalmologists on the Committee of Arrangements in addition to Dr. de Schweinitz were Dr. Howard Forde Hansell, Dr. McCluny Radcliffe and Dr. G. Oram Ring.

SOCIETIES.

The annual meeting of the Ophthalmological Society of Egypt will take place at the School of Medicine, Cairo, March 4, 1921.

The Milwaukee Oto-Ophthalmic Society held their annual meeting January 18, 1921. The following officers were elected: Dr. J. S. Gordon, president; Dr. E. H. Brooks, vice-president; Dr. J. E. Guy, secretary and treasurer.

The January meeting of the Kansas City Eye, Ear, Nose and Throat Club was held on the twentieth. An afternoon operative clinical program was given at the hospitals, followed by a dinner. Papers were presented by Drs. Hal Foster, E. L. Russell and Sam Roberts.

At the January meeting of the Ophthalmic Section of the College of Physicians of Philadelphia, the following officers were elected to serve for the coming year (1921): Chairman, Dr. G. Oram Ring; Secretary, Dr. Charles R. Heed; Executive Committee, Dr. Howard Forde Hansell, Dr. William T. Shoemaker, and Dr. George E. de Schweinitz.

On January 10, 1921, the St. Louis Ophthalmological Society and the St. Louis Ophthalmic Conference effected a merger. The new organization adopted the name, "The St. Louis Ophthalmic Society." Officers for the ensuing year were elected as follows: President, A. E. Ewing; Vice-president, F. E. Woodruff; Secretary-Treasurer, Wm. F. Hardy; Editor, John Green, Jr.

The Sioux City Eye and Ear Society has recently been organized with the purpose of meeting once a month during the winter months, for scientific discussions. The officers of the society for the present year are: President, Dr. James E. Reeder; vice-president, Dr. F. L. Secoy; secretary-treasurer, Dr. T. R. Gittins.

The officers for the Section on Ophthalmology of the Royal Society of Medicine for 1920-21 are as follows: President, James Taylor; vice-presidents, E. Treacher Collins, William Lang, A. Maitland Ramsay, J. B. Story, E. E. Maddox, Sir Arnold Lawson, and W. T. Holmes Spicer; honorary secretaries, M. L. Hepburn and W. H. McMullen.

The next meeting of the Oxford Ophthalmological Congress will be held at Keble College, Oxford, on July 6, 7 and 8. The discussion, to be opened by Dr. Victor Morax, will be on "The Causes of Infection after Extraction of Senile Cataract." The Doyne Memorial Lecture, by Mr. E. E. Maddox, will deal with "Heterophoria."

At the annual meeting of the Chicago Ophthalmological Society, held on January 17, the following officers were elected for the ensuing year: President, Dr. Ephriam K. Findlay; secretary, Dr. Michael Goldenburg; corresponding secretary, Dr. Robert Von der Heydt; councilor, Dr. C. O. Schneider. Dr. John E. Weeks of New York was a guest at the dinner at which about a hundred members of the society were present.

The Louisville Eye and Ear Society held a banquet on January 13 in Louisville in honor of Dr. A. J. Stuckey of Lexington, who was recently elected president of the Kentucky State Medical Association. Besides the twenty-five local members of the society, there were present twenty eye and ear specialists from neighboring cities. Addresses were made by Dr. Dan Griffiths, Owensboro; Dr. Stuckey and Dr. Adolph O. Pfingst, Louisville. Dr. Walter Dean was elected president, and Dr. Gaylord Hall secretary for the ensuing year.

The American Academy of Ophthalmology and Oto-Laryngology will hold its twenty-sixth annual meeting October 17-22, inclusive, in Philadelphia. The regular scientific program will be presented on the 17th, 18th and 19th. This will be followed on the 20th, 21st and 22d by an intensive postgraduate course on ophthalmology and oto-laryngoloy, due notice of which will be given by the committee in charge. Professor J. Van der Hoeve, of Leiden, Holland, has accepted an invitation to be the guest of honor of the Academy.

MISCELLANEOUS.

BOOK NOTICES. There is a Post Office ruling that makes it impossible for magazines to publish book prices without materially increasing the cost of publication. The second-class postage rate is figured separately on editorial and advertising matter. The ruling reads:

"Reviews will be regarded as matter other than advertising for the purpose of determining the postage chargeable on the publication, *provided the prices of the books are not given* and the reviews are otherwise free from features tending to give them the appearance of being designed to promote the sale of the books."

A Prize in Ophthalmology: Mr. and Miss Edmonds, of Wiscombe Park, Colyton, England, have founded a prize in ophthalmology in memory of their brother, Nicholas Gifford Edmonds, who fell at Magersfontein on Dec. 11th, 1899. The prize is one hundred pounds and is awarded every two years for the best essay on a subject dealing with ophthalmology, and involving original work. The competition is open to all British subjects holding the medical qualification. The management of the prize will be in the hands of a committee nominated biennially by the Medical Board of the Royal London Ophthalmic Hospital, who will select the subject of the essay and elect two examiners. The winner of the prize will have the option of giving a lecture on the subject at the Royal London Ophthalmic Hospital. The Middlemore prize, awarded triennially and run on very similar lines, has rendered valuable service to ophthalmology, and many of the prize essays remain as standard works.

The Illinois Society for the Prevention of Blindness, jointly with the State Department of Public Welfare, the State Department of Public Health, and the American Red Cross, in May, 1920, initiated a campaign against trachoma in several counties in the southern part of the State.

By means of a series of free clinics for the examination and diagnosis of eye ailments, which were conducted over a period of six months, it was disclosed that trachoma exists in some sections of the State to an extent which makes it a very serious menace to the sight of all citizens.

A total number of 2,700 patients were examined at these clinics, more than half of this number were children of school age. It was found that 20% of all the patients had trachoma, and of these trachoma patients, 26% were blind when they referred to the clinic (blindness estimated on a basis of 2/10 vision in the best eye). The average age of the trachoma patient is 34 years.

In the follow-up work with the patients of these clinics, which included inspection of the lids in pupils of the public schools in the communities under consideration, groups of school children numbering as many as fifty in a single community were found with trachoma in an infectious stage, and in attendance upon school.

At the time the campaign was initiated, Illinois had, in common with many other States, the usual regulation that trachoma shall be reported as a contagious disease, to the State Department of Public Health; no authority existed for exclusion from school or from other public gatherings, for either adult or child, who should have trachoma in its infectious stage. It was also discovered that practically no reports were being recorded with the State Department, and it was early apparent that the existing regulation for the control of trachoma must be supplemented by much more drastic requirements for the isolation of patients until treatment should remove the danger of contagion.

The State Department of Public Health gave splendid cooperation at this point in the amendment secured to the existing regulation, which gives Illinois probably the most drastic and comprehensive law for the control of trachoma, which exists.

Moreover, these requirements are working effectively in securing prompt treatment of school children with trachoma; they are being enforced by the school authorities, assisted by the cooperation of local physicians, and public welfare organizations, with the result that in communities where the campaign is still active, as high as 95% of the pupils are found to be under treatment within a week after exclusion from school.